January, 1947 Vol. 36, No. 1

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INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

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The Shop Teachers' Professional Magazine

WITH A LIGHT THAT CANNOT BE SEEN

R v.36 1947

Photo courtesy Radio Corporation of America

AMERICAN SOLDIERS in pitch dark able to see clearly the enemy ahead; scout cars speeding at 50 miles an hour along blacked out roads in perfect safety; officers of the law seeing clearly the operations of hijackers "hidden" by night: these are some of the miracles performed with the help of the infrared telescope. Workers in the dark are thus aided by a light that cannot be seen.

It can be said that young lads, on the way to take their place in the world, possessed of hungers for they know not what, driven by innate energies they know not where . . . are just as truly working in the dark. And so, too, educators must illuminate the obscure face of the future for them . . . using a light that cannot be seen, the light of searching and sympathetic wisdom. Only then can a boy establish a goal that is socially useful and a personal recompense. Only thus can stumbling feet be kept on the road.

And how can the educator's responsibility be discharged, how can the unseen light be effectively used, if not with and through the familiar things of school routine? For example, the drawing instruments a youngster will use when he comes to mechanical drawing class . . . their very selection can be an opportunity which gives a momentary glimpse into the beyond. These are tools of engineering, and engineering is the great hero of today and tomorrow. Shall its very instrumentality be chosen carelessly, treated with equal disregard? Or can the fact of great achievement be reflected into the life of the youngsters by a beautiful set, an exquisitely wrought set, a set to proudly possess the rest of the student's life . . . a set that may well be a touchstone, the source of another light that may also help to lead the lad onward and forever upward? Upon the right selection here vital values rest.

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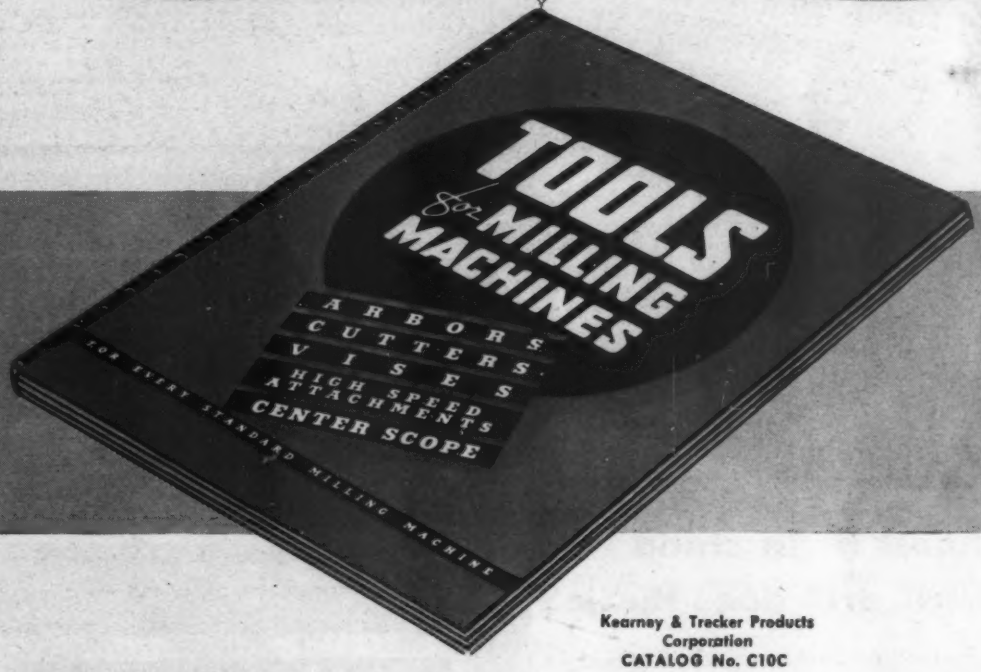

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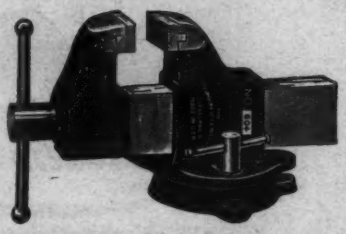

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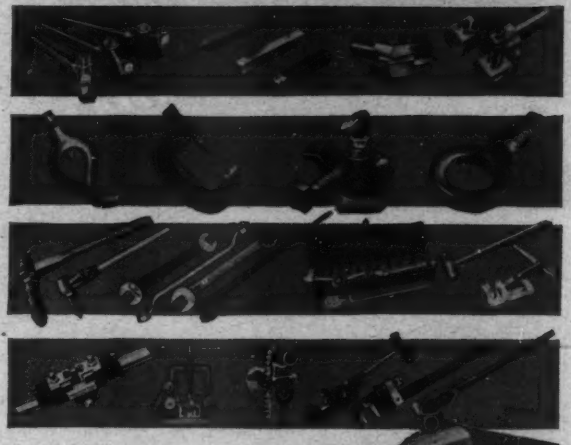

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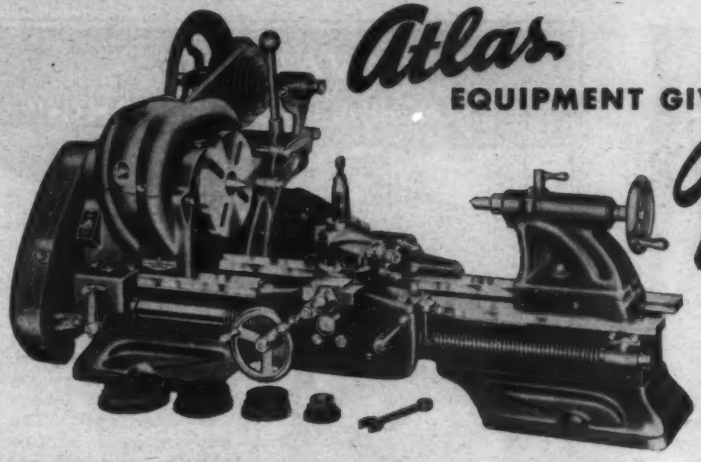

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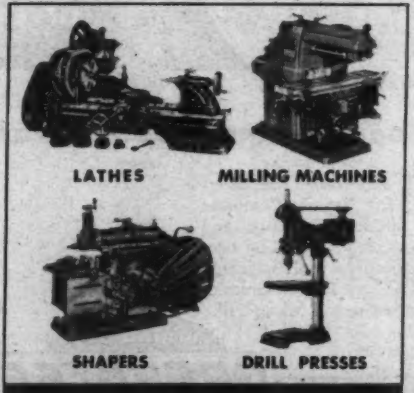

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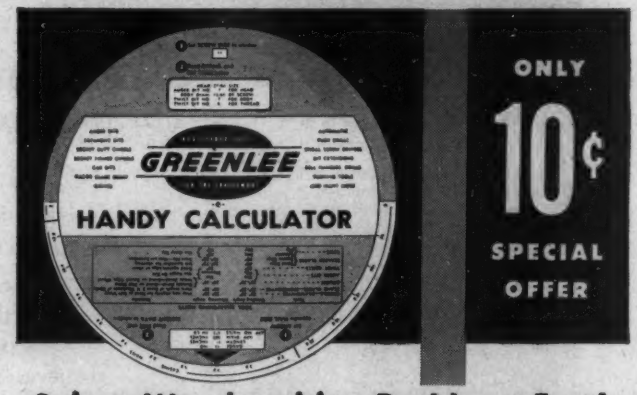

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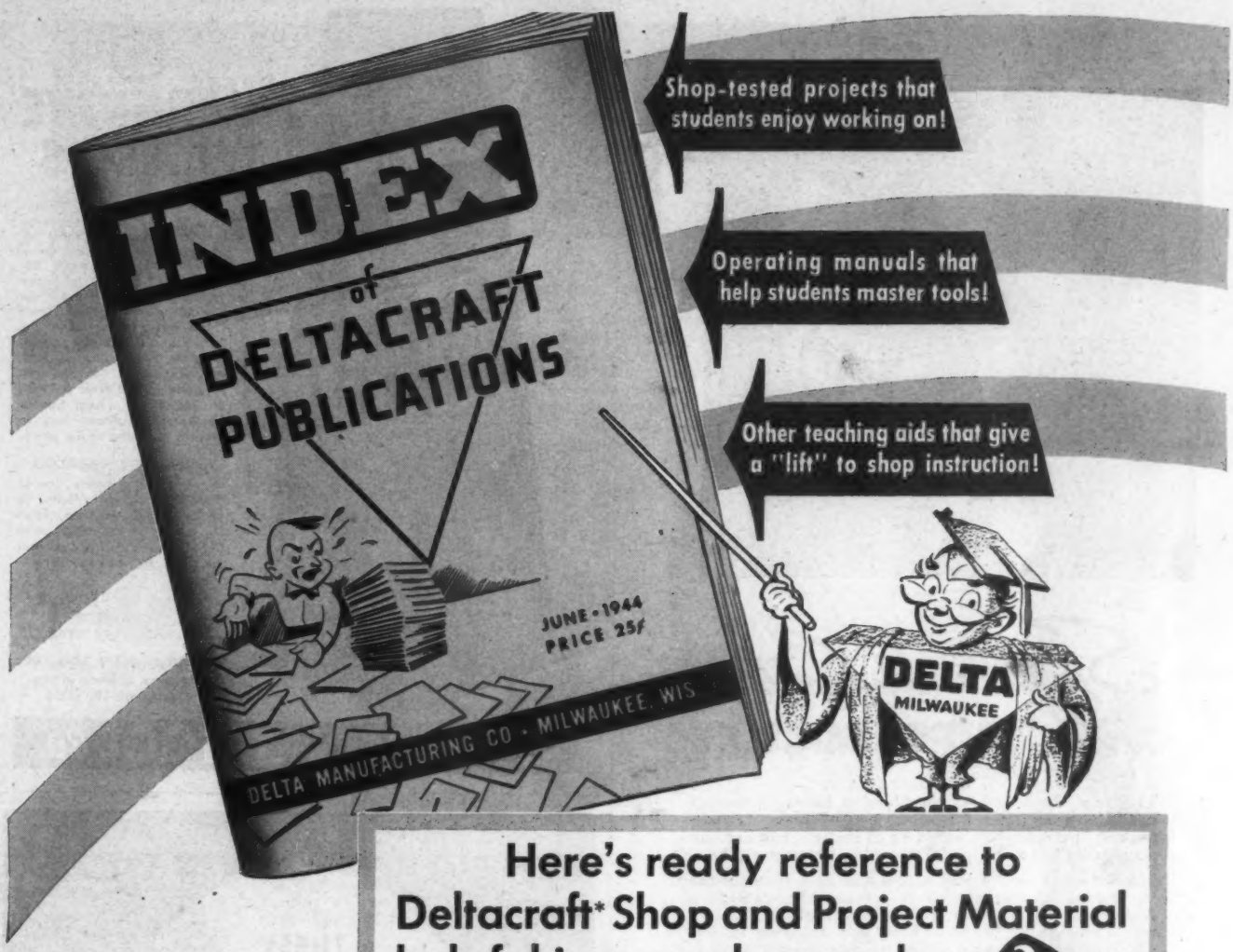

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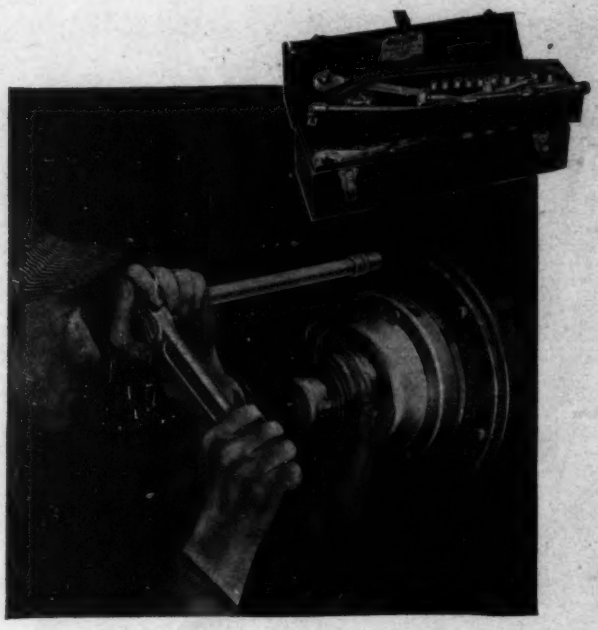

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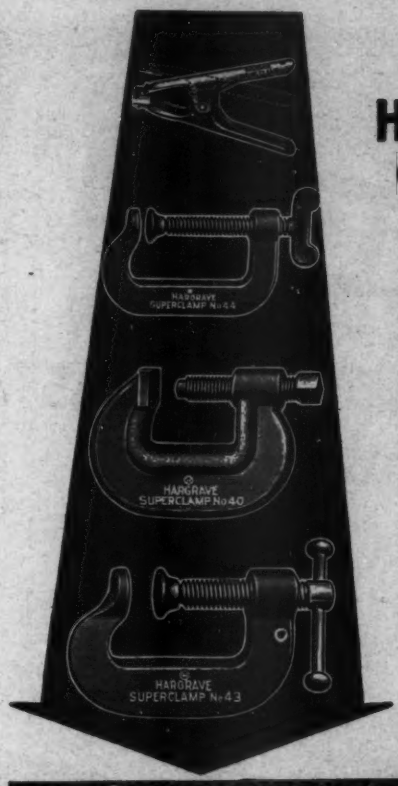

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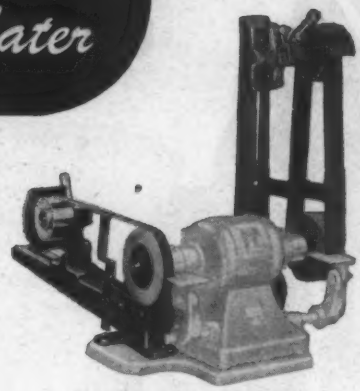

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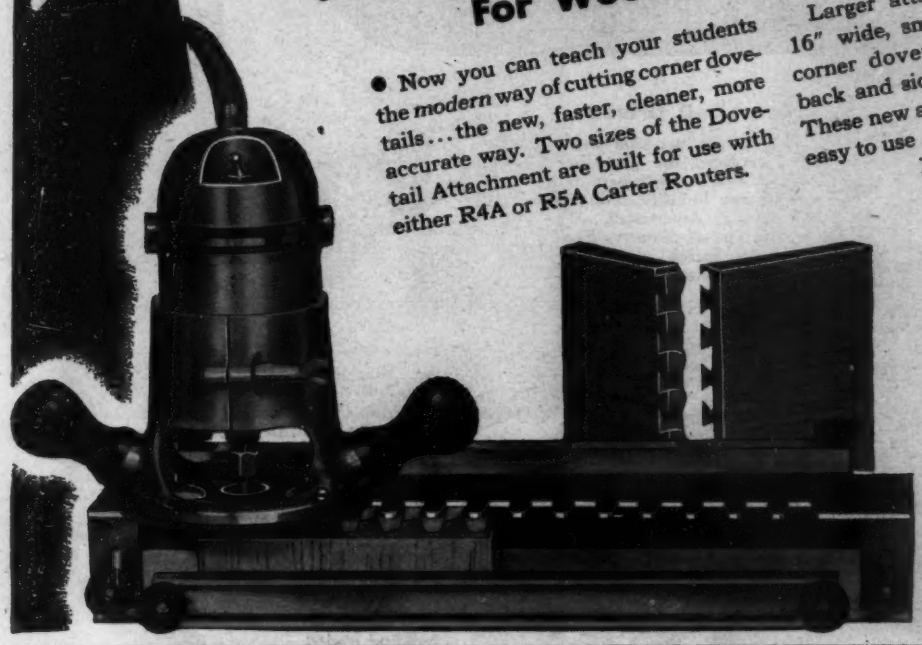

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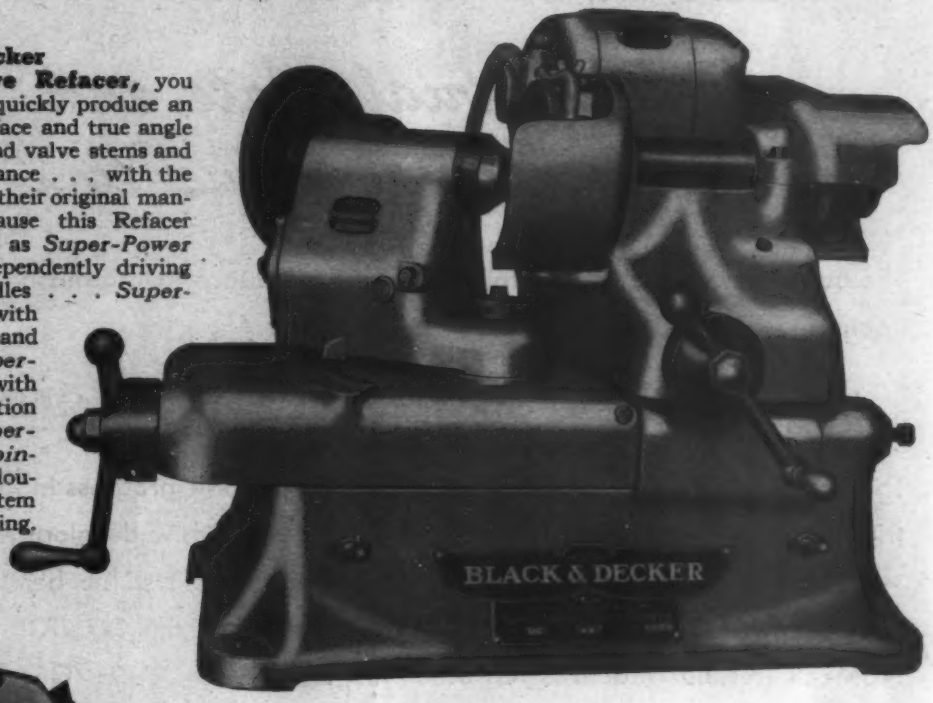

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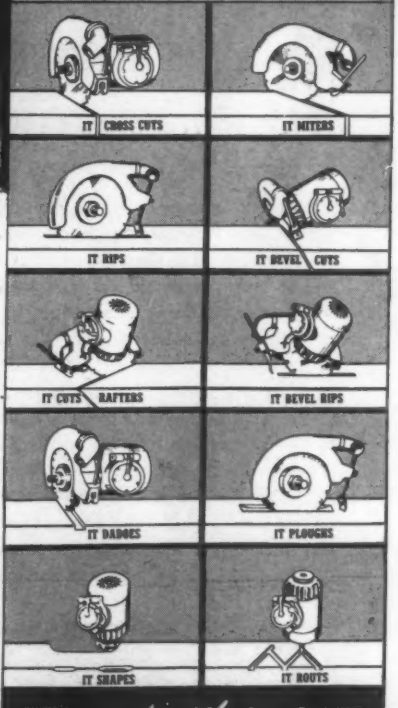

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▶ At the End of the Year

As INDUSTRIAL ARTS AND VOCATIONAL EDUCATION enters its thirty-third year of service to the shop teachers of America, it extends a most hearty greeting to all of its readers, and wishes them choicest blessings for Christmas and the New Year.

It is to be hoped that 1947 will show us a way out of the chaotic conditions which surround us here at home as well as the people abroad.

Unfortunately, the lessons which we should have learned from the war have not been learned. Instead, there is not only distrust and ill will among the nations, but among the members of our own society.

It is sincerely to be hoped that peace among the nations can be established during the coming year, and that an era of domestic tranquillity will be ushered in which will continue for many years.

In the meantime, let us all work at improving our service to the youth of America, and let us not forget that besides instructing them in the skills and factual knowledge pertaining to our various fields, we must try to instill in them an altruistic and co-operative spirit which will make them better members of society.

▶ The Annual Index

Volume 35 of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION was completed with the December, 1946, issue. For those who bind the magazine, a limited number of the annual index is being printed now. If you desire to have a copy of this index, be sure to write for it while the supply lasts. It will be sent gratis to you.

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JANUARY . . . 1947

The Alabama Plan for On-The-Job Training

CECIL M. WARD
Director
Vocational Education
Murphy Technical School
Mobile, Ala.

The Alabama plan for administering on-the-job training is unique. Those responsible for its administration anticipated most of the difficulties which have beset the program in many states and have guarded against them in a well-formulated plan which really works.

Public Law 346 provides that an appropriate state agency shall certify to the Veterans Administration institutions which have been found suitable to provide education and training authorized under the Act. The governor of Alabama, in response to a request from the Administrator of Veteran Affairs, designated the State Department of Education as the approving agency for all educational institutions and training agencies, except a few which are approved by the Veterans Administration directly. These few include installation of the Federal Government and a few business concerns which operate in several states. These agencies, however, may request approval of the state department so that their employees may receive benefits of certain training activities not required in the approval of the Veterans Administration and may receive supervision of training and related subject instruction under the state plan which is an obligation of the employer under the approval of the Veterans Administration.

Those in authority in the State Department of Education could not see the termination of their responsibility to the veteran and the Veterans Administration after making a survey and approval of a training agency. They felt that they were under obligation to see that the veteran received the education and training promised under the law.

To assure themselves and the veterans as well as the Veterans Administration that the best program would be available for Alabama, conferences of all interested agencies were held, and a state plan was developed.

As a result of these conferences, it was decided that no new program of training was needed, but that extensions of existing trade training programs would very adequately provide the veteran training in on-the-job and in trade schools.

Adjusting the Program to the Job

For some 14 years, the schools of Alabama have had in operation in local centers programs of co-operative vocational education in the high schools, called diversified occupation training. Junior and senior students in these high schools have been trained in some two hundred different occupations, by working in these occupations one-half day each school day and attending school for the other half day. The co-operative student works as a learner, performing the work of the occupation, progressing from one job to another as he becomes proficient as a learner in each job, and attending high school where he takes such high school subjects needed for the completion of his requirements for graduation, and a special high school subject which has been called "related subjects." These related subjects consist of the scientific and technical information needed to understand and perform the work of the job objective. The co-operative student learns the *how* on the job, and the *why* in the related subjects classes. At the completion of their four years of high school and two years of job training, these students are prepared to enter college if they find themselves able to do so (one recent graduate led her class at the state university) or are prepared to enter the occupation trained for with an advance standing, due to the two years of real work experience on a real job. Records show that 85 per cent of the graduates are employed in the work for which they received training under this program.

Confronted with evidence of an existing workable program, the committee adopted the following plan of co-operative vocational training for veterans.

1. The program of co-operative vocational training is just what its name implies. It is a program of education and training in which the public schools co-operate with private business and industrial establishments in giving the students a well-rounded course of vocational education including the development of the skills of the job and the related technical information needed. Business and industrial establishments provide students with work experiences according to a predetermined series of jobs and/or processes involved in the terminal vocational job objective and instruction in developing skills in those experiences. The school provides for the students a program of related study of technical information correlated with the job experiences in the business and industrial establishment. The student performs on the job under conditions of production. Therefore, work experiences control related study. It is, therefore, apparent, that work experience on the job and related study are inseparable. It takes both closely tied together to complete the whole training job.

Principles of Co-operative Training

1. The trainee is performing the actual duties involved in the job objective and is given an opportunity to progress from operation to operation as ability permits. The trainee is not to be held on any job, process, or operation beyond a reasonable learning period.

2. The trainee is under the immediate supervision of a competent worker in the job objective who is capable of giving on-the-job instruction and agrees to do so. The worker who gives supervision and instruction to the trainee in developing skills is an essential part of the training for the job objective.

3. The trainee devotes a minimum of 31 clock hours a week to performance of various duties of the job objective under adequate supervision and instruction.

4. The trainee devotes a minimum of 5 hours a week to the study of related subjects under the supervision and instruction of a qualified co-ordinator.

5. The trainee is not employed full time in any other job classification.

6. The trainee's wage shall (1) be comparable to that of other employees for productive work of like kind and quantity. (It is recommended that at no time (*a*) wage be less than 35 per cent of the minimum wage of the job objective, (*b*) nor less than would be paid a nonveteran for the same amount of productive work, (*c*) be graduated up to the minimum wage for job objective over the training period, (*d*) and average not less than 50 per cent of the minimum wage for job objective for the entire training period.)

7. The trainee has not been certified as eligible for entering the job objective by any legally established or commonly recognized qualifying, certifying, licensing, appointing, or examining authority.

8. The trainee has selected a job objective which he may reasonably expect to enter on the basis of his course of education and training and/or passing any required competitive examination.

9. The trainee shall be deemed to have completed his course of education and training when he has passed a qualifying examination and/or has been offered full-time employment in his job objective.

10. No present employee nor any person previously employed shall have his salary or classification reduced in order that he may draw subsistence or increase the amount drawn *except* that such pay may be reduced in proportion to the time taken from the normal work week for related study and/or training, otherwise than at productive work.

11. The trainee must have all prerequisites for admission to his chosen job objective except these which can be supplied through the training program.

12. Employees now working or having previously worked in any classification may be designated as a trainee for another classification, provided all of the above conditions are observed.

13. Establishments which pay employees on commission basis only will be approved, provided (*a*) there can be established the usual earning rate of persons trained in the occupation, (*b*) there can and will be made available the monthly earnings of the trainee in order to arrive at the subsistence to which he is entitled, (*c*) all the established principles governing co-operative training will be observed.

14. Veterans who are in a situation such that they are deemed to be worth, are earning, and are being paid wages, salary, or commission in an amount of $300 per month or more, shall not be deemed eligible for or in need of on-the-job training.

Co-operative Training for Veterans

Special provisions have been made for veterans who wish training in insurance and other selling occupations in which full compliance with the foregoing requirements would be impossible. These are as follows:

1. Each trainee is required to have two weeks of intensive schooling in predetermined subjects by the home office under direct supervision of designated persons in that office.

2. Each trainee will operate one full week under direct supervision of a trained and experienced salesman.

3. Each trainee will be supervised and instructed by an experienced salesman for not less than one day a week. This salesman will be on call for advisement at all times.

4. Each trainee will devote a minimum of 5 hours a week to the study of designated related materials under supervision of a co-ordinator.

5. The training period will be for a maximum of two years and the agreed journeyman's wage for trained insurance salesmen (to be set at not more than $300 per month).

6. During the training period the trainee will be guaranteed by the executive head of the organization with which he is connected not less than 35 per cent of the estimated monthly earnings of a trained life insurance salesman per month, contingent on his meeting the requirements of the approved training course.

7. Careful records of the trainee's progress in both the training course and field work will be kept and reported monthly to the State Department of Education. The trainee's connection will be terminated should it become apparent that he does not or cannot measure up to required standards of training and production. Not more than six months should be required to determine the trainee's aptitude or fitness for the business.

The state department has been interested for many years in the development of small businesses by the trainees of the co-operative departments after they have received sufficient training and experience. To prevent exploitation and to give maximum aid to the veteran trainee the following regulations have been made to assist veterans who wish to continue their training in businesses which they own or in which they have an interest:

Regulations for Veteran Trainees

1. The veteran has had training and/or experience that will give reasonable assurance of success.

2. Some local person engaged in the same business who is competent and qualified will agree to serve as sponsor and consultant for the trainee (such person

Application for Approval of Training Agency

Center _____ Co-ordinator _____

Agency _____ Address _____

Person responsible for training _____

Type of business _____

Occupations	*Number regular workers in each*	*Training stations available*	*Number D.O. and rehab. in training*	*Net stations available*

Is equipment adequate for training?——— Is equipment safe?———

Are sanitary conditions satisfactory?——— Is lighting adequate?———

Is personnel available for instructing trainees?———

Does personnel agree to take teacher training if made available?———

Is suitable space available for related study (on job or at school)?———

(Attach schedule of job and/or processes for which training is proposed)

Schedule of compensation (comparable to other workers)

1st period $——— per——— 5th period $——— per———

2nd period $——— per——— 6th period $——— per———

3rd period $——— per——— 7th period $——— per———

4th period $——— per——— 8th period $——— per———

Journeyman rate $——— per———

_____ 194—

_____

Local Supervisor, T & I Education

Recommended for:

Approval _____

Disapproval _____ Approved——— Disapproved———

_____

State Supervisor, T & I Education

_____ Date _____

Superintendent, Local School Board

Fig. 1. Application for approval

must not be an employee of the trainee and must sign a statement agreeing to act as sponsor and consultant).

3. The veteran must agree to attend related class for five (5) hours a week to study technical information relating to his work and the management of his business.

4. There must be established a monthly average earnings of the establishment as operated by a trained person. This must be established from a reliable source.

5. There must be reported accurately each month the net earnings of the establishment which must include cash, goods, and services (this for purpose of determining subsistence).

6. The length of the training course in the management of an establishment involving skills shall not exceed one year. The course in the management of a retailing or sales establishment shall not exceed two years.

The proper functioning of the Alabama plan depends upon several essential features. The most important of these are the co-ordinator and the progress charts.

Duties of the Co-ordinator

The fully qualified co-ordinator is an engineering college graduate with a minimum of three years' experience in some one trade or industrial occupation above the apprentice stage. He is responsible for the following types of activities:

1. Interviewing veterans who are pros-

TRADE ANALYSIS AND PROGRESS RECORD

Painting and Decorating

Job No.	*Type Job*	*Job performance*	*Reference reading*
1.	Erect scaffolding		
2.	Prepare surface for painting		
3.	Mix paints by formula (see information sheet shown in Figure 5)		
4.	Mix paints (lead and zinc)		
5.	Mix paints by volume		
6.	Select, care, and use paint brushes		
7.	Clean and store brushes, unused materials		
8.	Apply prime coat		
9.	Putty and sand after priming		
10.	Apply undercoats		
11.	Apply varnish		
	Old Wood Exterior		
12.	Prepare surface for painting		
13.	Correct defects in painting		
14.	Mix paints: First and second coats		
15.	Mix paints: Third and fourth coats		
16.	Repaint porch ceilings or floors		
17.	Paint lawn furniture, blinds, flower boxes, or screens		
18.	Paint shingles or rough siding		
19.	Paint store fronts		
	Glazing		
20.	Remove old putty and glass from sash		
21.	Mix and apply prime coat		
22.	Mix and bed putty		
23.	Measure, cut, and install glass and run putty		
24.	Paint wood or metal sash		
25.	Paint glass surface		
	Whitewash		
26.	Mix and apply whitewash		
	Large Buildings		
27.	Rig swing stage, brackets, or cornice hooks		
28.	Paint roof		
	Wood Interior		
29.	Prepare wood interior for painting		
30.	Mix and apply paint to wood interior		
31.	Paint over stain		
	Wood Enamel		
32.	Prepare new wood for enamel		
33.	Prime new wood for enamel		
34.	Putty and sand new wood for enamel		
35.	Apply enamel undercoats		
36.	Prepare old wood for enamel		
37.	Apply enamel to old wood		
38.	Apply gloss coat		
39.	Rub with pumice and water or oil		
	Floors		
40.	Remove old paint, varnish, shellac, or wax		
41.	Neutralize after using removers		
42.	Prepare wood floor surface		
43.	Repaint wood floors		
44.	Restore finish by bleaching		
45.	Paint new wood floors		
46.	Fill, shellac, varnish, and wax hardwood floors		
47.	Oil floors		
	Wood Finish		
48.	Prepare surface		
49.	Select, care, and use wood finish brushes		
50.	Mix and apply stain		
51.	Mix and apply filler		
52.	Mix and apply shellac		
53.	Mix and apply lacquer		
54.	Apply varnish to interior trim or furniture		
55.	Wax, rub, and polish hardwood surfaces		
56.	Correct defects in varnishing		
57.	Refinish worn woodwork		
	Wallboard		
58.	Prepare, size, and paint wallboard		
	Plaster Walls		
59.	Prepare new walls for calcimine or casein		
60.	Remove old calcimine or casein paint		
61.	Remove old wallpaper		
62.	Remove gloss oil size		
63.	Patch cracks or holes		
64.	Mix and apply calcimine or casein to new walls		
65.	Prepare walls for paint		
66.	Mix and apply paint to plaster walls		
67.	Apply enamel to plaster walls		
68.	Treat stains or gloss spots		
69.	Stipple plaster walls		
70.	Mix and apply starch to plaster walls		
71.	Make crumpled roll finish		
72.	Make sponge-mottle or vein-relief finish		
	Brick, Cement, and Stucco		
73.	Prepare brick wall for paint		
74.	Mix and apply paint to brick		
75.	Line a brick wall		
76.	Prepare cement or stucco wall for paint		
77.	Mix and apply paint to cement or stucco wall		
78.	Prepare and paint cement floors		
79.	Care for and operate spray gun and equipment		
	Metal Finish		
80.	Prepare metal surface for painting		

Job No.	Type Job	Job performance	Reference reading
81.	Mix and apply paint		
82.	Mix and apply aluminum paint		
83.	Paint metal water tank interiors or exteriors		
84.	Clean, treat, and paint galvanized iron		
85.	Prepare and paint tin surface		
86.	Prepare and paint copper, zinc, or bronze surface		
87.	Paint gutters, downspouts, flashings, or ducts		
88.	Clean and paint radiator		
	Familiar Decorations		
89.	Grain interior wood		
90.	Grain in distemper colors		
91.	Grain in oil		
92.	Glaze streak finish		
93.	Glaze brush stipple		
94.	Glaze rough stipple		
95.	Glaze antique or old ivory		
96.	Paint wood or iron with verdigris green		
97.	Decorate copper by oxidizing		
98.	Apply bronze to metal surface		
	Color Match		
99.	Select color schemes		
100.	Match and mix color bases		
101.	Make experiments in tints and shades		
102.	Make liquid color samples		
103.	Match dry color samples		
104.	Match gloss to flat samples		
105.	Match flat to gloss samples		
106.	Match rough and smooth surfaces		
107.	Match one color with several colors		
108.	Match color samples with fabrics		
	Paperhanging		
109.	Select and care for tools, material, and equipment		
110.	Remove old paper, calcimine, casein, or gloss oil size		
111.	Remove varnished or painted paper		
112.	Prepare painted walls for paper		
113.	Prepare plastered surface for paper		
114.	Prepare and apply size		
115.	Determine amount of paper needed		
116.	Match, measure, and cut paper		
117.	Paste, fold, and trim paper		
118.	Hang ceiling		
119.	Hang sidewalls and border		
120.	Hang special wallpaper		
121.	Hang burlap, canvas, muslin, or buckram		
122.	Lay out panels		

Fig. 2. Trade analysis and progress record

pective trainees and advising them of openings in on-the-job training for which their qualifications and past experiences seem to indicate their fitness.

2. To visit prospective training agencies to explain the program and to survey the establishment for the purpose of submitting to the State Department of Education an application for approval of the establishment as a training agency. See Figure 1.

During this visit he will secure from the prospective trainer a list of the training jobs the trainer agrees to have the trainee perform in the course of his training program. This will be the foundation of the training program.

3. To place trainees on the job.

4. To visit training establishments: to observe working habits of the trainee; to get information from the employer or trainer as to his progress; to discover how the trainee is using his related instruction material; to learn how the school may increase its effectiveness by giving new material or instructions to meet changing situations.

5. To conduct related subject classes for those trainees he co-ordinates or visits on the job.

6. To prepare a program of study or progress chart for each trainee under his care. This will include: (1) Job breakdown or trade analysis of the occupation. See Figure 2. (2) Bibliography of references for the occupation. See Figure 3. (3) Job sheets and progress record for each job. See Figure 4. (4) Information sheets for subject matter that may not pertain to any one job in particular but which may give information on safety practices, information that may not be available in current reference material, etc. See Figure 5.

Since the State Department of Education has allocated all of the funds available for vocational education the tremendous influx of on-the-job trainees soon taxed the capacity of existing programs to the limit. Many of the smaller communities did not have the co-operative part-time training programs in their high schools. To

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Additional References

The Handbook on Painting: National Lead Co., Free. Those living in Mobile may secure copies by writing to the National Lead Co., 722 Chestnut Street, St. Louis 1, Mo. Those residing outside of Mobile should address the company at 641 Freeman Ave., Cincinnati, Ohio. (Enclose three cent stamp.)

Painting Farm Buildings and Equipment: Prepared by Lead Industries Assn. in co-operation with U. S. Office of Education. 170 pp., 35 cents. Lead Industries Assn., 420 Lexington Avenue, New York, N. Y.

Fig. 3. Bibliography

care for the expansion in going programs and to extend the work into new communities, the State Department of Education and the State Veterans Administration entered into an agreement whereby the State Department of Education became an institution, receiving from the Veterans Administration $20 per month for each trainee enrolled and in related subject classes. The money so received to be used in paying the salaries of new veteran-training co-ordinators, and in paying the costs incidental to the operation of the program, not covered by regular trade and industrial funds. A very strict accounting of all funds is made and the excess accruing, if any, is turned back to the Veterans Administration.

After the program had been in successful operation for some months, the federal administrators office overruled the state administrator, holding that funds could not be paid for the function of co-ordination and supervision of trainees on the job and cut the tuition to $12.74 per month. This has resulted in considerable hardship, since under the original plan the Veterans Administration paid in addition to the tuition the $100 or whatever part of the $100 was needed for the purchase of books used for the instruction of the trainee and the tools needed on the job. Under the new ruling the Veterans Administration requires the State Department of Education to pay all costs from this meager amount.

Some relief for this situation may be expected under provisions of the new law enacted in the closing days of the last congress. This law permits the Veterans Administrator to make agreements with State Departments of Education for the type of service recently disapproved by the central office.

This program is one in which Vocational Education has another opportunity of demonstrating its worth. If the schools are alert and do a good job this will be an effective method of again proving to industry and the nation that vocational education can be depended upon for training under both peacetime and emergency conditions. Judging by past performances, vocational education will not need to fear.

Progress Record for a Given Job

Type job	*Job performance* 2 2 3 4 5	*Related study references*	*Date read*
Floors		PDW 3, 67, 75–76, 228–229	
		HPM 164–165	
Repaint wood floors		PAD 26–27, 78	
		MCP 126–127, 184–186	

1. What are the basic pigments of floor paint?
2. Give a mixing paint formula for second coat for yellow pine.
3. Give a mixing paint formula for third coat.
4. What is likely to result if too much oil is used in paint which is to be covered with varnish? Why?
5. What is the essential difference between paint formulas for new and old wood floors?
6. How is a floor that has been previously varnished or shellacked prepared for painting?
7. How long should each coat of paint be allowed to dry before applying the next coat?
8. To which coat or coats should tinting materials be added for a three-coat paint job?
9. Why is varnish used in floor paint?
10. What is used as a binder instead of linseed oil?
11. What are the objections to using shellac in a final coat for wood floors?
12. On what kind of floors is shellac principally used?

Fig. 4. Progress record for a given job

MIX PAINTS: INFORMATION SHEET

Safety Precautions in Mixing Paints

The painter must exercise great care in mixing and applying paints containing lead and zinc pigments which may produce lead or zinc poisoning, resulting in skin disease, general discomfort, crippling, and sometimes fatal affliction. The most common symptoms are anemia, upset stomach condition, colic pains, blue line on gums and wrist drop.

Benzol fumes may produce a "benzine jag" or dizziness and may ultimately result in permanent damage to the eyesight.

Benzol poisoning is the result of the hands or other parts of the body coming in contact with benzol.

Turpentine fumes nauseate some painters and are harmful to the kidneys. Turpentine coming in contact with the skin may result in painful but curable cracking and blistering.

Wood alcohol fumes are exceedingly destructive, especially to the eyes.

Always use rubber gloves when mixing or applying acid. Keep the hands wet when using hydrochloric acid. Always provide the best possible ventilation in working with hydrochloric (muriatic) acid. The first effect of muriatic acid fumes is nose bleeding. The cumulative result is hardening of the arteries.

The following suggestions are given as precautions to be observed in mixing or applying paint: Keep the hands out of paint; wear gloves; thoroughly cleanse the hands with soap and running water before eating; take a hot shower after work hours; remove paint from under and around finger nails; frequently change to clean overalls; keep thinners from coming in contact with the skin; never use thinners to remove paint from the skin; provide ample ventilation when mixing or painting indoors; and above all, see a doctor immediately upon the first appearance of any symptoms. Remember, your health, wealth, future, and family are at stake.

Read the excellent article on the handling of removers, on pages 226–227, *House Painting Methods*. (See bibliography shown in Fig. 3.)

Great care must be exercised in the storage of oils, paints, thinners, gasoline, kerosene, alcohol, etc., to prevent the danger of fire. Inflammable materials should be kept in sealed cans at all times. All paint cans should be covered at night. Oily rags should be gathered up and properly disposed of at the close of the day. Too much emphasis cannot be given to the importance of care in using inflammable materials near an open flame or while smoking.

Spontaneous combustion results in the loss of money, time, and sometimes life. Burlap, excelsior, rags, mops, and waste saturated with oils, stains, paints, etc., when placed in a pile or kept in a closed room will sometimes ignite.

Fig. 5. Sample information sheet

Foremanship Training and the Conference Method

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(Continued from page 434 of the December, 1946, issue)

Conference Devices

I. *Questions*
- A. Overhead questions (directed to entire group)
- B. Direct questions (directed to individual; *always* ask it first, and direct it last)
  1. To secure information that some one individual has
  2. To bring back the attention of an inattentive member
  3. To bring in slow responding individual
  4. To break line of thought in an argument
  5. To distribute responses
  6. To avoid lag
- C. Informational questions (call for information)
  Example: How many men are in the armed forces of the United States?
- D. Thought question (require thinking)
  Example: How could vocational education be made to be of greater benefit to industry?
- E. Suggestion question (suggest the answer)
  Example: Don't you think if foremen would devote more time to the study of human relations their departments would run more smoothly?

II. *Miscellaneous Devices*
- A. Laundry lists (long lists of factor or elements)
- B. Charts, curves, and graphs (bar, pie tin, pictorial, histograms, frequency polygons). Select and use so as to avoid deception
- C. Diagrams and sketches
- D. Direct statements
  1. By the leader
  2. By group leader
- E. Displays and samples
- F. Visual aids
  1. Movies, pictures, still film, sketches, prints, maps, graphs, blackboard work
- G. Assignments for future reports
- H. Cases
  1. Hypothetical (imaginary to fit certain conditions)
  2. Actual (from experiences of group members or others)
- I. Stories to illustrate points
- J. Reversal of questions by the leader (to secure group statements)
- K. Votes to secure majority opinion
- L. Analysis of situations or conditions
- M. Summaries
- N. Chart headings

SUGGESTED CHART HEADINGS

Factors Hindering Co-operation	*Who or What Is to Blame?*	*What Should Be Done?*
(1) Mistakes and errors	Causes	Remedies
(2) What is wrong?	Who or what is responsible? Effects	Ways and means remedies
(3) Factors causing dissatisfaction	Who or What is to blame?	Remedies
(4) Causes	Responsibilities	Remedies
(5) What is wrong?	Who is to blame?	What is to be done?
(6) Present methods	What's wrong?	How to improve
(7) Types of accidents	Causes Responsibility	Remedies
"PRO-AND-CON" CHART		
(8) Advantages		Disadvantages

The Conference Operation Sheet. Just as any manufacturing process requires a blueprint and specifications, as any well-taught lesson is based upon a lesson plan, in the same manner a conference should be based on a conference operation sheet. On this sheet the conference leader should state his topic and its objectives clearly and concisely and he should outline his conference and plan his work in some detail.

The title of the conference should be clearly stated at the top of the operation sheet. Immediately following the title, the leader's name should appear. Next, the objectives should be listed under two headings, *Direct* and *Indirect*. The direct objectives are made known to the group in the introductory statement, while the indirect objectives are noted on the operation sheet so that they will be kept in mind by the leader, but they are not to be disclosed to the group. Indirect objectives might cover such things as:

1. To change the attitude of the foreman in Department B toward safety.

2. To develop a more satisfactory attitude toward company rules on the part of all foremen.

3. To inspire foremen X and Y to pay more attention to company policies and observe *channels* more carefully.

Stating objectives of this type to the group would tend to arouse antagonism and might possibly defeat the purpose of the conference completely. Obviously the indirect objectives may be the *real reasons* that the conferences are being conducted, but such objectives would be very unlikely to be attained if stated. The instructor in charge of the conference leadership classes should assist each conference leader to work out his conference operation

sheet in detail, making suggestions as to the type of chart headings, conference devices, etc., that will be likely to produce the best results for a given topic. A sample conference operation sheet blank that discloses the various elements of such a sheet is submitted for study.

Sample Conference Operation Sheet Blank

Instructions: The conference operation sheet for a conference bears the same relationship to a conference as a lesson plan bears to a lesson or a blueprint to a piece of production work. With this in mind fill out the following conference operation sheet blanks, planning the steps of your sample conference in detail.

Title of Conference _____

Leader _____

Objectives: _____

Direct — Made known to the group

1. _____
2. _____
3. _____
4. _____

Indirect — Known to leader but not made known to the group.

1. _____
2. _____
3. _____

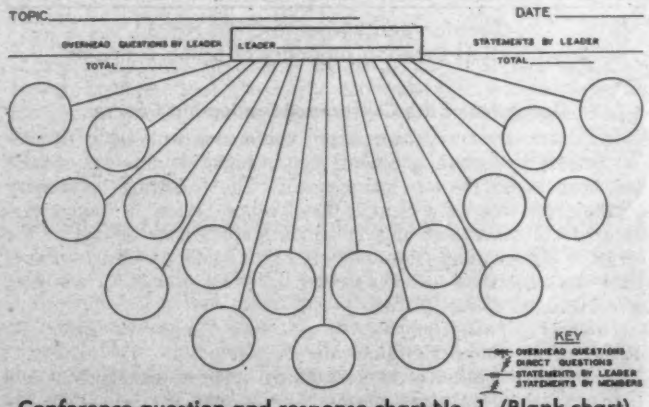
Introductory Points

(To introduce the conference — give it a setting, to tie it up to preceding work or present conditions and to stimulate interest.)

1. _____
2. _____
3. _____
4. _____
5. _____

Body of the Conference. Devices used to collect and classify data, select and evaluate it, and to reach a decision in the conference. List the devices you intend to use such as: questions, headings for analysis charts, graphs, diagrams and charts, cases (real and hypothetical), examples, exhibits, etc.

(Use space below and back of sheet)



Conference question and response chart No. 1. (Blank chart)

Use back of sheet to complete body of the conference. Conclude with points you will wish to stress in your *summary*.

Conference Response Charts. If the conference group is small, it will be found very beneficial to have a member keep what is known as a *response chart* on which will be recorded the numbers of questions and statements made by leaders and other group members and also additional data that may be used in improving conference leading techniques. The chart gives a ready means of determining who is not contributing, who is taking too much time, whether or not the leader is talking too much, not reversing questions, and similar items. Sample blanks and used charts are presented to show the general pattern followed. Obviously codes can be developed to collect many conference items not listed on these sample charts, Nos. 1, 2, and 3. Chart No. 1 is a sample blank; Chart No. 2 records the activities of a very animated conference that almost got out of hand a time or two because of active discussions and questioning between certain members; Chart No. 3 presents a conference for which a conference rating scale summary report appears as rating scale chart No. 3 in the section devoted to conference rating that follows immediately.

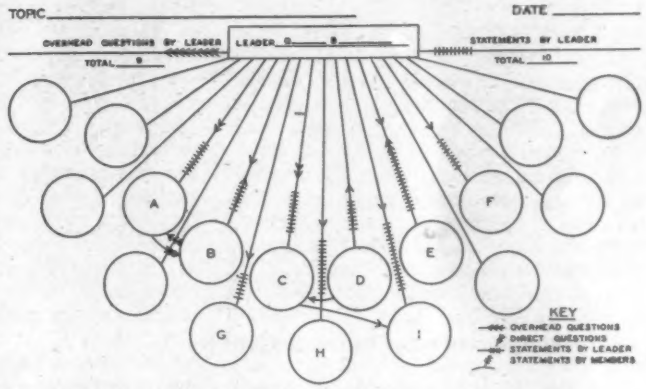


Chart No. 2

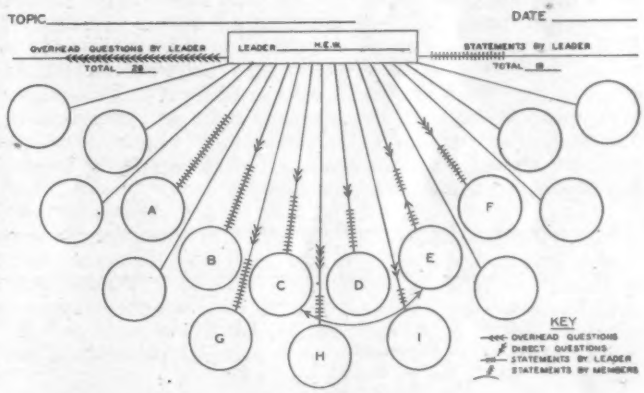
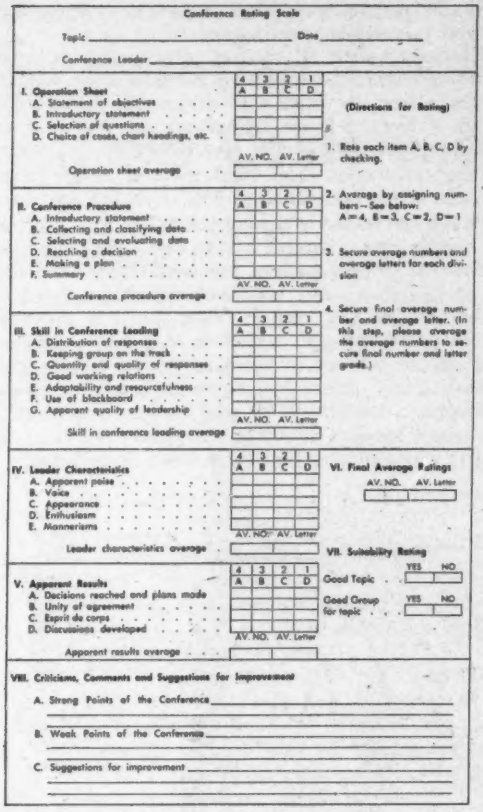


Chart No. 3

Conference Rating Procedures. Since the various conferences that are presented in a series of conference leadership classes are put on for the purpose of learning conference leading technique through actual participation and by means of constructive criticism, these conferences should be rated by means of some standard scale, even though it may be done informally. These rating scales should be kept simple and, though intended for written response, they may be used almost as effectively for point by point oral review of the leader's offering. Suggestive Rating Scale Charts Nos. 1 and 2 are included to indicate the elements that should be rated in any conference. Chart No. 1 is filled out by all members of a conference group rating the conference, Chart No. 2 being used simply as suggestive of the factors to be looked



Conference Rating Scale

Topic _____ Date _____

Conference Leader _____

I. Operation Sheet
A. Statement of objectives
B. Introductory statement
C. Selection of questions
D. Choice of cases, chart headings, etc.

(Directions for Rating)

1. Rate each item A, B, C, D by checking.

Operation sheet average

II. Conference Procedure
A. Introductory statement
B. Collecting and classifying data
C. Selecting and evaluating data
D. Reaching a decision
E. Making a plan
F. Summary

2. Average by assigning numbers — See below: A=4, B=3, C=2, D=1

3. Secure average numbers and average letters for each division

Conference procedure average

4. Secure final average number and average letter. (In this step, please average the average numbers to secure final number and letter grade.)

III. Skill in Conference Leading
A. Distribution of responses
B. Keeping group on the track
C. Quantity and quality of responses
D. Good working relations
E. Adaptability and resourcefulness
F. Use of blackboard
G. Apparent quality of leadership

Skill in conference leading average

IV. Leader Characteristics
A. Apparent poise
B. Voice
C. Appearance
D. Enthusiasm
E. Mannerisms

Leader characteristics average

VI. Final Average Ratings

V. Apparent Results
A. Decisions reached and plans made
B. Unity of agreement
C. Esprit de corps
D. Discussions developed

Apparent results average

VII. Suitability Rating

Good Topic . . YES NO

Good Group for topic . . YES NO

VIII. Criticisms, Comments and Suggestions for Improvement

A. Strong Points of the Conference _____

B. Weak Points of the Conference _____

C. Suggestions for improvement _____

Conference method of teaching. Chart No. 1

For rating the conference procedure

Conference Steps	100 A 4 93 Checking Points for EXCELLENT	92 B 3 85 Checking Points for GOOD	84 C 2 77 Checking Points for FAIR	76 D 1 70 Checking Points for POOR	69 F 0 0 Checking Points for FAILURE
1. Introductory Statement Check 1 A B C D F 2 A B C D F Av. =	1. Thorough and complete understanding of topic was established 2. Much interest was aroused in entire group	1. Good understanding of topic was established 2. Good interest was aroused	1. Some understanding of topic was established 2. Some interest was aroused	1. Little understanding of the topic was established 2. Little interest was aroused	1. Very little or no understanding of topic was established 2. Very little or no interest was aroused
2. Collecting and Classifying Facts and Data Check 1 A B C D F 2 A B C D F 3 A B C D F 4 A B C D F 5 A B C D F Av. =	1. Excellent distribution of responses was secured 2. Very wide variety of appropriate conference devices was used 3. Chart headings very appropriate and well chosen 4. Complete tabulation of all data put on blackboard 5. Group kept on track consistently without detours	1. Good distribution of responses was secured 2. A wide variety of conference devices was used 3. Chart headings appropriate and well chosen 4. Data was well tabulated on blackboard 5. Group kept on track with few detours	1. Fair distribution of responses was secured 2. Some variety of conference devices was used 3. Chart headings fairly appropriate and fairly well chosen 4. Fair blackboard tabulation of data was secured 5. Group off the track part time; some detours	1. Little understanding of the topic was established 2. Little interest was aroused 3. Chart headings inappropriate and poorly chosen 4. Some tabulation secured; some materials omitted 5. Group off track with many detours	1. A few individuals monopolized the discussion 2. Only one or two devices used 3. Chart heads caused conflicts in classifying data 4. Much material omitted from blackboard tabulations 5. Group off the track as much as on
3. Selecting and Evaluating Data Check 1 A B C D F 2 A B C D F 3 A B C D F Av. =	1. Data that applied to the topic were very carefully selected 2. Evaluation procedure fitted data excellently 3. Evaluation was made very carefully and very thoroughly	1. Data that applied to the topic were well selected 2. Evaluation procedure fitted data well 3. Evaluation was made carefully	1. Some selecting was made of data that applied to topic 2. Evaluation procedure fitted data with some difficulty 3. Partial evaluation was made	1. Little effort was made to select data that applied 2. Evaluation procedure fitted data poorly 3. Little evaluation was made	1. Very little or no selection was made of data that applied 2. Evaluation procedure fitted data very poorly 3. Very little or no evaluation was made
4. Reaching a Decision Check 1 A B C D F 2 A B C D F 3 A B C D F Av. =	1. Complete agreement was secured readily 2. All agreements reached were sound and logical 3. Decisions reached completely covered objective of conference	1. General agreement was secured quite readily 2. Most agreements were sound and logical 3. Decision reached covered objectives very well	1. Partial agreements were secured on most points 2. Some agreements were not sound and logical 3. Decisions reached covered most objectives	1. Little agreement was secured 2. Many agreements were not sound and logical 3. Decisions reached covered some objectives	1. Little or no agreement was reached 2. Most agreements were not sound and logical 3. Decisions reached covered few or no objectives
5. Making a Plan Check 1 A B C D F 2 A B C D F Av. =	1. Excellent workable plans were developed 2. Plans were entirely logical in relation to decision reached	1. Good workable plans were developed 2. Plans were very logical	1. Plans were mostly workable 2. Plans were fairly logical	1. Plans were workable only with difficulty 2. Plans had little connection to decisions reached	1. Plans were developed with great difficulty 2. Plans had very little or no connection with decisions reached
6. Summary Check 1 A B C D F 2 A B C D F Av. =	1. All important points of conference were covered completely. 2. Excellent emphasis was given to all important points, decisions, and plans	1. Most important points were covered well 2. Good emphasis was well distributed to important points, decisions, and plans	1. Many important points were covered 2. Emphasis was given to many points	1. Some important points were covered 2. Some emphasis given to some points	1. Very few important points were covered 2. Little emphasis given to important points

Suggestive conference rating. Chart No. 2

for in each conference step under item II, Conference Procedure, in Chart No. 1. The rating charts are then collected by the leader and are summarized and put into the form shown in the Sample Summary of Group Criticisms, Conference Response Chart No. 3. This chart presents data taken from all of the rating scales of the entire group involved in the sample conference represented in Conference Questions and Response Chart No. 3 mentioned previously. A review of the summary chart of the conference following a review of the conference itself usually gives the members of the group definite pointers as to methods of improving their conference leading techniques.

Topic: _____

I. Operation Sheet
B, A, A–, A, A, A–, A, A–, A.

II. Conference Procedure
A–, A, B, A–, A–, B, A–, A–, B.

III. Skill in Conference Leading
A, B, B, A–, A–, B, A–, A–

IV. Leader Characteristics
A, A, A–, B, A, B, A, B, A

V. Apparent Results
A, A–, B, A–, A–, B, A–, B, A

VI. Final Average Ratings
A–, A, B, A–, A–, B, A, B,

VII. Suitability Rating
Good topic Yes *8* No *0*
Good group for topic Yes *8* No *0*

VIII. Criticisms, Comments, and Suggestions for Improvement

Strong Points
1. Good preparation shown
2. Good questions
3. Questions well distributed
4. Good conference procedure
5. Knew subject
6. Used direct questions
7. Conference well planned
8. Used blackboard well
9. Good voice
10. Presented an excellent introduction
11. Good distribution of responses
12. Excellent material developed
13. Covered main items of topic
14. Good working relations between group and leader

Weak Points
1. Lack of response
2. Conference hit dead spots
3. Too many direct statements

Suggestions for Improvement
1. More direct questions to individuals to break up subconferences
2. Keep conference under control better

Question and Response Chart No. 3
Sample chart showing summary of group criticisms

Outcomes of the Conference Leadership Courses

In practically every case where conference leadership courses have been conducted, a general improvement in foreman morale has been noted by top management. The following "Summary of the Outcomes of a Sample Conference Series" is taken verbatim from the report of a concluding conference of one of the series of classes in an Ohio industry. This summary clearly proves that the objectives of conference work as previously outlined were attained at this plant.

Summary of the Outcomes of a Sample Conference Series (As Reported for One Series of Conferences.)

1. Developed a better understanding between management and plant personnel on plant matters.

2. A general lifting of the spirit of the personnel of the plant has resulted.

3. Better co-operation among the various departments in the plant has been brought about.

4. There has been a general improvement in the over-all efficiency of the plant.

5. The group has obtained a broader viewpoint on supervisory work and its relationship to business success.

6. The class members have learned to conduct meetings of groups of workers and to obtain positive results from these meetings.

7. The quality of leadership of the members has been much improved, and they have learned how to gain the confidence of those under their direction.

8. They have learned to appreciate the modern methods of handling men and women in a plant of this kind.

9. The group members have gained a proper conception of the entire company organization and the relationship of the whole organization.

10. They have become acquainted with the plans, policies, methods, and ideals of the company, and they are able to explain them to the men in their departments.

Vocational Education and Society

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It has been found that there are some workers in the field of vocational education who have not thought deeply enough about their work to have formed a philosophy of their own upon which they can lean when criticism of their work appears.

It is very important that those responsible for the vocational program in our public schools have clearly in mind the place their subject occupies in the educational experience of their pupils. They should be able to recognize its social and economic significance in national affairs, and they should have a background that will enable them to justify the inclusion of their work as an integral part of public education. This is particularly true in the case of the director of vocational education since he is responsible for directing the thinking of his teachers concerning their field, as well as representing them before different groups in the community.

The following discussion is presented merely as a suggestion of one line of reasoning. It is not expected that all who read it will agree with the points made. It is hoped, however, that those who have objections to it will feel the necessity of setting up for themselves a line of reasoning which they are willing to accept as their basic philosophy.

Social Need for Vocational Education

Every member of a work gang is expected to carry his share of the load. Every member of a football team has to do his part in whatever play is called. The extent to which these individuals fail to do their share, to that extent the other members of the gang or team must assume additional responsibility. Similarly, each member of society must assume the responsibility of supporting himself. If he is healthy this is the minimum that is expected of him. There are members of society who for reasons beyond their control cannot support themselves. This throws upon the able citizen the problem of supporting himself and in addition assuming part of the burden of those who are unable to help themselves. This means that each individual in society must produce at least as much as he consumes and the extent to which he is able to do this depends upon the training he has received.

Since progress in society is governed by the contributions of its members it becomes the responsibility of society to assure itself that each of its members is prepared to make a contribution to society on some level. This would indicate that it is the responsibility of society to provide opportunities for training in order that the citizen who must carry the load may prepare himself to do so.

Standard of Living: As civilization advances there follows in its wake a very positive advance in the standards of living of those who have aided in this movement. Many things which at first are considered luxuries eventually become necessities, as the members of society have so adjusted their lives to their use that they have come to depend on them in their efforts to subsist.

Society in the United States is organized as a democracy, and the members of this democracy demand a higher standard of living than that which prevails even in those countries which have centuries of civilization behind them. The perpetuation of this democracy and the maintenance of this advancing standard of living depends on a high measure of intelligence on the part of the citizens in regard to social matters; and this intelligence cannot rest entirely upon the native ability of these citizens, but must needs be developed by such specific training as each individual is able to assimilate.

Productivity of Citizens: Again, if this democracy is to progress, each individual within it must produce at least as much as he consumes. Moreover, during certain periods of childhood and old age he produces nothing, and is therefore a liability to the state. It is necessary therefore, that during his years of service, he must produce more than he consumes in order to cover what he has consumed or will consume during his years of nonproductivity. It is obvious from this that the sooner the individual reaches his highest productivity the sooner he will be able to produce his quota, and, perchance, produce a surplus over his consumption, thus contributing to the general prosperity of the community.

This raising of the individual to his highest efficiency does not mean that he should avail himself of the first opportunity to go to work; it does mean, however, that he should be directed into that field of endeavor in which his mental and physical abilities will be used to the utmost; it means also that he be given specific training for his job before as well as after he enters it.

Rights of a Citizen: As the advancement of society and the safety of this democracy depends on the ability of the citizens to do their share in maintaining or raising the standard of living, it is imperative that the training mentioned in the preceding paragraphs be provided. There has accumulated in this world during the course of its existence a vast fund of achievement and knowledge which is held in storehouses as an inheritance from the past. It belongs to no individual or group of individuals as an estate, but to society as a whole. If society is to receive from its members the service it has a right to expect, it must be prepared to offer to these members free access to this storehouse. The accepted intermediary between it and the members of any community is the school; it is to this agency, therefore, we must turn when considering what must be done to prepare these members for efficient citizenship.

Some authorities claim that a democracy depends on complete equality; others maintain that equality of opportunity constitutes its foundation. Whichever of these we accept as a base it implies that every individual has a *right* to make his way in organized society, to profit by its achievement; and that, in return, it is his *duty* to render it service in proportion to his ability to serve. Because of this right of the individual, society owes it to its citizens that they have free access to the storehouse of accumulated knowledge and experience to the extent to which they are able to profit from it. Because of this duty of the individual society can demand that its members avail themselves of the opportunities provided, and make themselves vocationally fit on some level.

Responsibility of the School: As the school is the agency to which society has delegated the task of preparing its members for efficient citizenship, it should be of interest to consider to what extent this responsibility is being met.

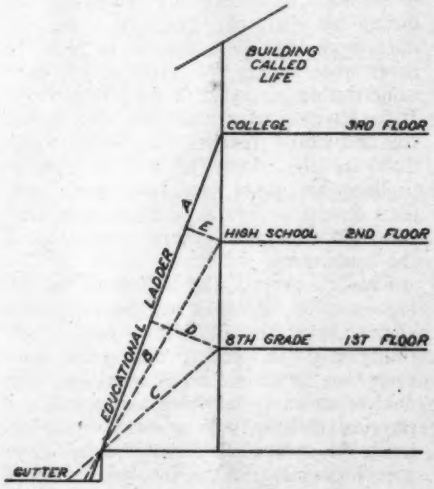


Chart 1. The educational ladder

Ladder *A* on Chart I illustrates the route formerly accepted as the one over which all must travel in gaining their educational experience. This was planned with the idea of providing equal educational opportunity for all, but it has become increasingly evident that it failed in its purpose.

In recent years it has been borne in on those responsible for the preparation of the next generation of society, that this system of providing a common educational path was quite inadequate when measured by the standard of providing training which would make each individual *vocationally fit on some level.*

There were many children who, for various reasons, could not avail themselves of this opportunity to travel to the topmost rung of the educational ladder; there were others who had no desire to do so; and there were still others who were not likely to profit from such a route because of their limitations.

It is obvious that those who, for any reason, did not reach the top of the ladder were at a decided disadvantage when it became necessary for them to get off and enter the building called, *life.* When the time arrived for them to leave the ladder it was necessary for them to jump in order to reach the building and the shock, resulting from the sudden change from school to an environment for which they were totally unprepared, was fatal to the future progress of many. These bring out quite clearly the vastness of the job which society has before it in developing a type of education which will prepare for efficient service each of those who leave school before they have traveled far enough along educational ladder *A* to obtain lasting benefit from it.

To enable the school authorities to reach this vast army who cannot, or will not, accept the high school or college training which has been so generously provided, it has been suggested that additional ladders *B* and *C* be provided, leading to the levels below that reached by the existing ladder. A boy might then start out on his educational career and travel directly toward the sphere in life to which his ability or inclination directs him. If, when he reaches that sphere, his ambition is aroused and he desires to return to the ladder which leads to college, auxiliary ladders *D* and *E* should be provided to enable him to do so.

Not only will each individual in the community have equal educational opportunity by this means, but he will have specific training leading toward the floor in life at which he is aiming, or for which he is fitted. These different educational routes may suggest that dividing lines are being created which will tend to make class distinctions. However, is it not true that many of our children must go to work at the earliest age permissible, and are these individuals not as truly entitled to direct preparation for their future work as those children who need not become self-supporting until they have gone through high school or college?

School authorities have not reached the point where they are willing to erect ladders *B* and *C* and condemn any child to an educational journey which is specifically designed to prepare him for a *job* rather than a profession. They have done much however to aid him in his efforts to regain his foothold on ladder *A* when, as so often happens, his greater experience convinces him of the value of a higher education. As evidence of this we should note the extension service provided by our agricultural colleges; the correspondence courses of the noncollegiate grade offered by some of our leading universities; and last, the part-time school, designed to reach those millions of children between 14 and 18 years of age, who are in that uncertain stage between the complete lack of appreciation of education, and the dawning realization of its value.

Federal Right to Demand Vocational Fitness: In the preceding paragraphs we have discussed what society owed its members; let us consider for a moment what it has a right to expect in return. The effectiveness and security of the state is developed and maintained in direct proportion to the training of its citizens. Society has a right therefore, for the good of the state, to insist that each of its members avail himself of such training facilities as the state provides. As the safety of the state is thus involved the authorities have a right to punish those who fail to do so. This leads to the conclusion that vocational education for every member of the community could reasonably be insisted on by the Federal Government as a means toward the preservation and advancement of the state. The Federal Government has not exercised this right, but has left to each state the privilege of requiring such educational standards as their particular circumstances seemed to warrant. However, the Federal Government has endeavored to stimulate favorable action on the part of the states by making liberal grants of land and money. The legislation enabling them to do this will be considered in another assignment.

Economic Need for Vocational Education

The purpose of this section is to direct attention to the relationship that exists between the nature of the vocational education provided in a country and its economic status.

It is generally recognized that the less material a craftsman has with which to do a job the greater is the necessity for him to be skilled in his craft. A less skilled person might be able to do the job provided enough material was available to insure him getting a second or even a third chance to meet the standards set up. This might be illustrated by the woman who wishes to make a dress. She might have a whole bolt of cloth with which she might experiment, or she might have just enough material to do the job. Obviously, with plenty of cloth, an inexperienced person might cut and try until she achieved what was wanted. On the other hand, with just enough material to make the dress, the woman is going to be quite sure that she knows and can do the necessary things before she starts cutting. If she is not sure of her ability, she is almost certain to ask someone to teach her how to proceed.

With this thought in mind, it may be recalled that there was a period in the history of this country when lumber, coal, iron, and copper were obtainable in such vast quantities that they seemed inexhaustible. During this era of plenty, little thought was given to the need for training the men who fashioned or used these materials. More recently, the supply has been

seriously restricted, with the result that greater care has to be taken in the training of the workers who must supply our increasing needs from a diminishing supply.

This diminishing supply of natural resources is illustrated by the situation in Michigan in regard to the supply of lumber. At one time, Michigan had what appeared to be an inexhaustible supply of white pine. Trees were available from which wide boards of clear lumber were sawed. Because of the plentiful supply, no effort was made to conserve the material and workers wasted much of it in their eagerness to use only the best. Today, Michigan has to go elsewhere for its pine, and the knots which formerly were cast aside are carefully utilized in every construction project. What was once discarded has now become of commercial value.

Again, copper and coal were easily obtained near the surface of the earth. As time has passed, miners have had to go deeper and still deeper into the bowels of the earth to obtain them, until now we hear of mines which go down for a mile or more. As the depth increases, the cost of production goes up, with the result that the men who use these materials in industry must become more efficient in order to make up for the increased cost of securing them.

There are those who feel that the diminishing supply of natural resources need not concern the people of this country, since we are sufficient unto ourselves, and are quite independent of other nations. As we reflect on this, however, we find that there are many industrial materials which we obtain from abroad and which must be paid for by the products of our industries. Rubber is an excellent example of this.

Then we have wood pulp, wool, hides, tea, coffee, and many other materials, all of which are imported in large quantities into the United States. These products have to be paid for with goods; thus goods become a medium of exchange. The more efficiently we can produce these goods, the more we can purchase abroad, and this efficiency depends largely upon how efficiently we utilize the resources with which nature has provided us.

That this matter of the conservation and intelligent use of these resources is tremendously important is widened by the fact that the Federal Government is actively engaged in carrying on research for the purpose of informing our manufacturers and workers concerning better and more economical methods of utilizing them.

An extensive program of reforestation has been going on for a number of years for the purpose of perpetuating our supply of lumber. Research laboratories have been established to deal with the problems connected with the use of the products of our forests. Similarly, research has been going on dealing with the conservation of water power. The results of these research projects are passed on to management and worker to the end that their efficiency is increased.

Thus we see that our leaders in government recognize the importance of training the men who must compensate with their increased skill and knowledge for the diminishing supply of natural resources.

Agriculturist Needs Training: In a similar manner, American agriculture has prospered in the past because of the plentiful supply of free virgin soil. The farmer went on the assumption that the fertility of the soil was inexhaustible. When this fertility had been exhausted, he moved on to another section of free land and proceeded to repeat what he had done in his previous efforts. In other words, it was easier to move than it was to cultivate the soil and maintain its fertility. There came a time, however, when the frontier had disappeared and the last of the free land had been taken up.

This compelled the farmer to remain in one place, and since he had to make a living from the farm he began to think of building it up. This task called for study and research, and led quite naturally to the realization that farming was rapidly becoming a science. Scientists have to be trained, hence we provide agricultural education in order that the farmer of today and tomorrow may be able to solve the many perplexing problems growing out of the ever present demand for greater production at lower cost.

Here again the Federal Government has demonstrated its belief in the need for training farm workers by establishing experimental stations for the purpose of developing new and better methods of farming. Not only this, but it has provided colleges where opportunities are present for conducting research on agricultural problems. The results of this research are made available to the farmer through long- or short-term courses at colleges, through county agents who convey the most modern developments out to each farm in his area, or through day or evening school courses in the local high school's department of vocational agriculture.

Thus we see that as the supply of virgin soil decreases and as farming becomes more complex, the need for training for farm life becomes a major concern of the state.

The Place of the United States in the Industrial World: The American manufacturer has prospered in the past and the United States has become the leading industrial nation as a result of certain conditions. Among these are: (1) an abundance of material at a low price; (2) a great body of cheap foreign labor; (3) the inventive genius of the people; (4) the ability of the people to organize for production on a large scale.

The first of these has become of relatively less advantage than it was earlier in our history. Certain materials were exploited and are now scarce. Other materials are relatively harder to obtain. In other words, the advantage we had over competitive nations in this respect has been lessened if not actually eliminated.

The second item listed is no longer an advantage. When the country was new, the development work to be done was tremendous but the population was small. Roads had to be made and railroads had to be built; and the natural supply of labor was quite inadequate for the task. Large numbers of foreigners were brought in and the work of pushing the frontier back was simplified. More recently, our frontier has disappeared, our roads and railroads have been built and the population of the country has increased. Thus we find the development work to be done diminishing and the number of people available to do it increasing. Because of this, the foreign labor which at one time was a boon has become a liability. Since those advantages have been removed, we must rely more on the two that remain if we are to maintain our position in the industrial world. This means that our people must be given more training if their abilities to invent and organize are to be developed to the fullest extent. This involves training to prevent waste of our natural resources, as well as to use them more efficiently.

Vocational Education Training Is Needed to Reduce the Waste of Human Labor: Society loses through at least two forms of waste labor; namely, the *unemployed* and the *imperfectly employed* or *untrained*.

It has been estimated that at least 10 per cent of our employable man power is constantly unemployed. Naturally, this figure is greatly increased during the business depressions which occur periodically.

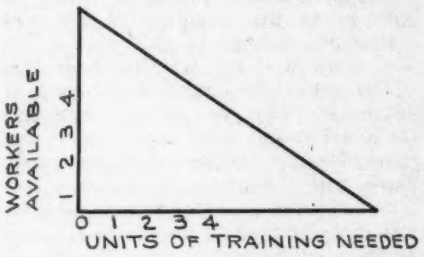
Each hour that each of these workers is out of a job they produce nothing, which means that society loses the goods which they might have produced had they been employed. Furthermore, this loss can never be replaced, since the opportunity cannot be recalled.

Many of those who are unemployed are in this situation because they lack the training which would enable them to find a job in a higher occupational area.

The occupations in business and industry which require little or no training are overcrowded, while those requiring more training are relatively less crowded. This fact is illustrated by the following diagram which shows that the number of people available for any job decreases in direct proportion to the increase in training needed to fill it.

When no training is needed for a job, there are large numbers of people who can fill it. Similarly, when much training is needed for a job, there are relatively fewer people who are prepared for it. Thus we

see that the lower occupational area is likely to have more people available to occupy it.



Many of those in the lower area have potential abilities which, with training, would fit them for occupations on a higher level where the competition for jobs is less keen. Because of this, an adequate vocational training program will enable these individuals to develop their potentialities; it will fit them for an occupation in keeping with their abilities; and will then tend to relieve the congestion at the bottom of the occupational scale. This relief should open opportunities for some of those who are unemployed, and thereby attain two objectives. First, it will cause those who are raised to produce in accordance with their capacity, and, second, it will provide opportunities for the unemployed to make their contribution to goods and services which determine the standards of living desired by society.

Vocational Education Is Needed to Meet the Demand for Skilled Labor: There is a popular belief that, in view of the intense specialization in industry, the demand for skilled craftsmen has passed. This belief is likely to be based upon the experience of some who view the assembly lines in operation in our industrial plants. Those who hold this point of view observe the worker on the line doing one operation day after day, and reach the conclusion that little training is necessary to prepare him for his job. While this is true, they fail to realize that the parts being placed on the article being manufactured must arrive at a given point on the line at a given time. The line must be kept constantly supplied at all points if it is to function efficiently. If one part out of the thousands required to complete the product has not arrived at the appropriate point on the line exactly when it is needed, the whole line is disrupted.

To keep this steady flow of parts moving at the proper speed toward their points on the line necessitates a vast organization of highly skilled workers, each one of which must be a broadly trained individual. Furthermore, there are in the background of the assembly line thousands of special machines without which this line would be hopelessly disorganized. These machines are specially built to perform thousands of intricate operations. Since there are relatively few of any one kind, they cannot be built, like an automobile, on an assembly. They are designed and built by craftsmen whose responsibilities lie far beyond those of the single operation worker.

It is quite true that the number of jobs in industry for which little training is needed has greatly increased. It is equally true, however, that the number of all-round craftsmen needed has not decreased. Some jobs requiring considerable training have become obsolete, but others have arisen to take their places as a result of new discoveries. In many cases, the skills and knowledge acquired in the former occupations have been merely transferred to one of the latter.

As evidence of the persistent demand on the part of industry for all-round skilled workers, we need consider only the increasing complexity of the machines, equipment, and motive power units coming into common use. Scientific methods have displaced rule-of-thumb methods. Metals are manufactured and purchased on the basis of rigorous tests and are subject to rejection on the basis of these tests. The metal which at one time was melted according to the whim of a particular foreman is now mixed according to a formula which is based upon rigid chemical analysis.

Lumber is purchased on the basis of standard rules which include the amount of moisture content permissible in any given order. Even the crates in which merchandise is shipped are built according to specifications set up as a result of extensive research carried on by our government.

Many other materials and products might be added to those which call for minute analysis and tests, which, in turn, call for men with a great deal of technical knowledge as well as a considerable skill in the manipulation of materials and equipment.

Since craftsmen are necessary, even in modern industry, it is imperative that they be trained, and it is reasonable to assume that some of this training should be provided by the public schools for those young people who will one day fill the positions requiring more than the minimum of preparation. It is only by doing this that we can hope to continue our progress in improving our methods and products, and in initiating new and still more efficient machines and equipment to increase still further our production of the world's goods.

Vocational Education Is Needed to Supplement Apprenticeship: At one time in our history, craftsmen were trained by means of apprenticeship, the young worker working with the journeyman and gradually absorbing the mysteries of the craft by observing the journeyman as he performed the operations of his craft.

Specialization in industry, coupled with a lack of interest on the part of employers, has tended to eliminate this practice, with the result that, with the exception of our larger corporations, few employers care to assume the responsibility and cost of training apprentices.

During the past few decades, there has been stored up in industry a great body of technical knowledge which is directly related to the work of the craftsman and with which he must be familiar if he is to perform his tasks intelligently. This knowledge cannot be acquired readily by the worker in the shop. Because of this, it seems desirable that the young worker be given an opportunity to acquire this knowledge through the medium of vocational classes in the school.

Even when the youth is working under an apprenticeship, and has a definitely planned program of experiences, it is difficult sometimes for him to receive the breadth of training he should have in his trade, due to the limited equipment in the shop in which he is employed. In such cases, it is possible sometimes for him to supplement his shop experiences by other experiences gained in the school shop.

In either case, the school has a definite part to play in the training of apprentices, not as a substitute for apprenticeship, but rather to supplement what the youth can actually learn at his work station.

Vocational Education Is Needed as an Aid in Meeting the Increased Cost of Living: It has been pointed out that our frontier has disappeared and that the farm areas with virgin soil have almost disappeared. This has caused the farmer to remain in one place, with the result that the fertility of the soil has been gradually reduced. Now we have an agricultural class whose ability to produce food — with the present methods — is diminishing.

As our ability to produce food has dropped, our population has grown steadily, leading to a condition in which our national appetite has been outgrowing our national larder.

With more people and relatively less food, the cost of living has increased steadily throughout the years.

If the present standard of living is to be maintained, and the cost of food kept at the present level or reduced, it is necessary that farmers be educated to produce more and cheaper food. Industrial workers must be trained so that each man will produce more, and women must be trained to disburse the family income more intelligently. This means that we must have vocational education to the end that individual efficiency may be increased and that more goods and agricultural products may be available for distribution at a lower cost.

Points to be Made:

a) There is a definite relationship between vocational education and the economic condition of the country.

b) As the supply of raw materials diminishes, the need for the training of those who fashion them increases.

c) The need for vocational education in the field of agriculture increases as the supply of free virgin soil available decreases.

d) The large body of scientific knowledge which has been built up in the fields of farming and industry makes it necessary for the farmer and the mechanic to have specialized vocational education, if they are to make their fullest contribution to the needs of society.

e) Since the position of the United States in the markets of the world is less advantageous than it was in the days when native raw materials were more easily obtained, it is becoming more and more necessary to rely on the native genius of the people and their ability to organize for production on a large scale to maintain our position as the leading industrial nation in the world. This means that vocational education must be provided to develop these two characteristics to their fullest.

f) Our federal officials have indicated their interest in vocational education by setting up research laboratories, by disseminating the results of their research, and by appropriating several millions of dollars for its promotion.

g) The occupational area in which little training is needed is overcrowded. There is a corresponding lack of workers in the areas where considerable training is necessary. In the first of these are many who have potential abilities which, if developed by training, would enable them to occupy positions in the latter area. If this were done, the congestion among the less skilled would be relieved and thus provide opportunities for some who are unemployed.

h) There is a constant demand for all-round skilled craftsmen. This demand can be supplied only through training. Vocational education can make a definite contribution to this training.

i) Since there is much to be learned in the skilled trades which cannot readily be taught on the job, the apprenticeship method of training mechanics can be enriched through related vocational courses given in the public schools.

j) The cost of living is influenced by raising or lowering the production per man. This production can be increased materially if each worker is given an opportunity to prepare himself to contribute to the limit of his capacity. Vocational educators have the responsibility of providing these opportunities.

Vocational Training for Young British Workers

GEORGE GRETTON
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The developments in British education which are taking place under the Education Act 1944 represent partly a rationalization process. Nursery, primary, and secondary school systems are being streamlined and co-ordinated to provide one comprehensive and free process of education from the age of two to the age of 16. Within that process there is the machinery for an immense range of variation of treatment to suit the individual. Perhaps the most radical conception here is that of a free, universal secondary education irrespective of wealth or social class, breaking completely with the tradition of secondary education as a form of academic training adapted to the needs of the professional and black-coated (known in the United States as "white collar") classes. Secondary education in Britain will be something broader and more flexible, more closely geared to the overall needs of a new generation of citizens than ever before. At the same time it will be supplemented by a nationwide system of further education providing for the technical, intellectual, cultural, physical and social training and guidance of all young people after they have left the secondary school.

An extensive body of further education has grown up during the past decades, and this will be supplemented and co-ordinated to form a complete system. This falls mainly under four headings: one, vocational education in technical and commercial subjects, art and handicrafts; two, nonvocational education for young people; three, *county colleges* which all young people between school-leaving age and 18 who are not otherwise receiving full-time education will be required to attend for the equivalent of one whole day a week for 44 weeks in the year.

These county colleges will take about four years to come into full operation. Finally, there is the youth service, which co-ordinates the work of local authorities and national voluntary organizations, concerned with the leisure activities of young people from school-leaving age up to 20 years.

Vocational training may be full time, but to a far larger extent it is part time and is carried out in the form of evening courses. There are at present about 30,000 full-time students at technical colleges and art schools, whereas the number of part-time students is well over one million. Employers have been quick to recognize the value of this vocational training, and frequently release young employees for part-time attendance at courses during working hours. Other employers have established schools of their own on similar lines. The range of courses is very wide, from engineering, chemistry, naval architecture, and building, to commercial and secretarial subjects. The work is closely correlated with the practical occupation of the student and the system is a valuable means of developing and increasing the stock of technical skill and knowledge upon which the nation's industries so largely depend for their efficiency.

Education for Adults

Nonvocational further education is organized by local education authorities, by universities and by certain voluntary bodies. It caters not merely for young people but for adults as well, and one of its most effective branches is the university extension lecture and the courses provided by Britain's Workers Educational Association, which both reach university standards. Apart from the intellectual and cultural sides, there are courses enabling young people or adults to pursue gymnastics, or games. This organization is particularly valuable in giving training for citizenship in the widest sense, not merely through its intellectual and cultural training but by enriching the social activities and contacts of young people and canalizing their social instincts along desirable lines.

The county colleges and the youth services offer similar facilities. Movements such as the Boy Scouts and Girl Guides, the youth organizations associated with the churches, and the social clubs and centers in the poorer districts all have already a long tradition of social and educational service behind them. Newer organizations such as the boys' preservice organizations — the sea cadets, army cadet force, and air training corps — have also played a

great part during World War II. Under the new plan, the minister of education takes responsibility for all activities of this kind. His department will correlate their work, give them financial assistance, help to train their functionaries, and generally supervise their activities, in order to ensure that the whole youth of the country can be catered for. This new development is a recognition of the principle that education is not confined to school and the curriculum, but is concerned with the entire development of the child and youth into a social being.

Tradition of Service

In planning this reorganization of the whole national education system, the Ministry of Education has not forced the voluntary schools and organizations to break with their long and valuable traditions of service. A new special agreement has been made by which voluntary schools, such as the church schools, may maintain their degree of independence within the framework of the national system, and financial help is being given where necessary to enable them to meet the capital cost of bringing their buildings and equipment up to modern standards. Similarly, endowed grammar schools may either meet half the cost of capital renovation and retain substantially their present degree of independence, or they may pass all their financial obligations to the local authority and become *controlled schools* with only a limited degree of independence.

It will take some years to put the new educational plan in its entirety and complexity into full operation. For one thing, the speed of building is limited by the general postwar housing needs, and the war has also hampered the supply of teachers. About 70,000 teachers will be needed; 70,000 applications have been received while 24,000 have been accepted. Nineteen colleges with accommodation for 3800 are now open and working and 318 teachers have completed their course. But when the scheme is complete it will be commensurate with the needs of any nation in the world.

Efficient Shop Teaching

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Much has been written on the subject of teaching possibilities in the industrial-arts shop, but it appears that much laxity still exists in many shops in the use of individual projects for greatest teaching advantage. There are probably several reasons for this condition. A lack of proper organization is perhaps the prime reason. Others are: inability or unwillingness of the teacher to analyze his course intelligently; too much emphasis being placed on the finished product, thereby making it the end rather than the means to an end; diversified concurrent shop activities and the problems of teaching common to this type of organization; and perhaps a belief on the part of the school, the community, and even the industrial-arts teacher himself that the shop is a place where projects are made and objects repaired rather than a laboratory maintained and operated for the purpose of enabling children to learn.

There is reason to overlook some of these weaknesses in some cases due to teacher shortages, heavy teaching assignments, inadequately trained teachers, restricted curriculums, and the limitations of human possibilities. However, the fact still remains an important one that there are young people to be educated to live in a complex and uncertain society, and this is no time to pass lightly over their education or any part of it. A heavy responsibility rests upon the schools today.

Just what particular needs lie ahead cannot be accurately predicted, but it seems certain that the objects, materials, relationships, skills, and processes common to the life of tomorrow will be greater in number, scope, and uses than those of today. If this is true, industrial-arts courses, since they function relative to these matters, should play an increasingly greater part in contributing toward intelligent and happy living. The industrial-arts teacher must be alert to the trends of necessary knowledges and skills and must shape his course so that it will contribute those things expected of it and for which it is so well suited.

Many shop or laboratory teachers have a tendency to discount the value of the application of correct teaching theory. This is, no doubt, largely due to the very nature of the subject they teach. This causes an otherwise good teacher to be but a poor or mediocre one. Teaching is a science as well as an art, and such matters as curriculum analysis and teaching techniques must be given consideration equal to that given to manipulative procedures.

Shop teachers, as a whole, are already out in front in an understanding of and a general approach toward course objectives. Fortunately, the course lends itself to an exemplification of its objectives. Teacher training institutions, too, have for the most part done a very commendable job in educating their students in the purposes and procedures of the field. The fact still remains, however, that many teachers pass up golden opportunities to make their projects contribute most toward the attainment of their objectives. This is, perhaps, the greatest weakness of shop teachers. Careful analysis and coordination of the course objectives, course content, course organization, projects, teaching possibilities, and teaching procedures to be used, will enable the teacher to see and evaluate the separate parts and the whole of his course. He will then be able to make a greater number of practical applications to the needs of the boys and girls of today and the men and women of tomorrow.

Most shop teachers are not too enthusiastic when it comes to doing the work just discussed. Instead, they are interested in doing things manipulative. Nevertheless, these matters form the foundation from which the course springs and upon which it is built. The activities carried out or the projects made in the shop are the means by which the goals are attained rather than the goals themselves. The good teacher must have an appreciation of this foundation and then skillfully manipulate the learning activities of his students until a proper and predetermined degree of proficiency in all the various knowledges, relationships, understandings, and skills is attained.

The goal of apprenticeship, a craftsman's career with assurance of job security and substantial wages, should outweigh any financial problems necessary to reach that goal. It is my opinion that only a very few veterans who have been given a chance for a career through apprenticeship would want to turn down the opportunity to become a journeyman because of a reduction in subsistence allowance during the last year or two of their training. — *William F. Patterson.*

In British Honduras, an important source of mahogany used in the United States, the only railroad is a privately owned logging line, 35 miles long, built to bring out mahogany.

Industrial Arts and Vocational Education

John J. Metz, Editor

HOBBIES — ARE WE EMPHASIZING THEM ENOUGH?

It is quite common that the teacher of any shop subject becomes very much wrapped up with the one which he is teaching and to emphasize only that which applies to his one central topic. As a matter of fact, this is to be expected of a good teacher, but it also is expected that the instructor will look beyond that which he teaches and study and ponder over the problems which beset him whom he teaches.

That the school subject matter is only one of the student's problems is quite evident. What can the shop teacher do for his students beyond teaching his own subject in a thorough manner?

The first thing for the shop teacher is to know his boys. No matter how many students are in a given class, a study of their individual characteristics will disclose that there are many different attitudes, ambitions, mentalities, and outlooks on life.

Such a study also will disclose many interests and it is just these interests that should be scrutinized carefully because through them the adolescent can be reached and led. The teacher himself may have very broad interests in many fields. Can he sell some of these to his students? A trial may be very enlightening, and it may be very helpful to some of the students.

The medical profession repeatedly has called attention to the fact that we are living in an age which produces an ever increasing number of mental cases. The beneficial effects of hobbies on mental health are well known — why not emphasize them more in the school shop. There is probably no teacher who has a better opportunity to impress on his students that there are many shop subjects that lend themselves admirably to filling out the student's free time with nerve soothing activities — something that will help the adolescent acquire balance and poise, and give him an interest that will help him avoid pondering too much upon himself.

What is more, many students will gladly avail themselves of opportunities to acquire worth-while hobbies. Teachers also may find that they can gain more from their own hobbies if they share them with others. Teaching is nerve racking. Why not make hobbies exert their beneficial effects in the lives of both teacher and pupil.

WHERE TEACHERS OF INDUSTRIAL ARTS AND VOCATIONAL EDUCATION FRATERNIZE

There are still too many states where there seems to be no common ground on which the teachers of industrial arts and vocational education can meet to look calmly at their respective contributions to the field of education with the idea of finding a common denominator which will make their offerings still more valuable to the students who attend their respective classes.

It is true that there is a difference between the objectives sought by the teacher in the industrial-arts shop and those set up by the instructor who teaches a vocational subject. The one is concerned in giving his students an elementary grasp of, and experiences with, a variety of materials and the tools used for shaping and forming these materials. He also attempts to give his students an over-all view of what the workers who use these same tools and materials in performing the world's work do while earning their living. The industrial-arts teacher might be said to have the job of helping the student to make a preliminary survey. He also is assisting him to locate the right area which he can then cultivate more thoroughly later on.

When that preliminary work has been done, the industrial-arts teacher has performed his work, and then the vocational teacher takes over and prepares the student to do intensively what he must do later on when he enters the world as a worker in a definite field.

There is no need for rivalry or enmity between the men who are working in these two fields. Both of them need specific training. Both of them have an important piece of work to do. It is true that both may work with the same tools, and use the same materials but the end for which they are working is different. But both can learn valuable lessons from the work done by the other. If that were done more generally, both industrial arts and vocational education would improve.

It would be well, therefore, for the teachers who are in these two fields of education to study this matter with an open mind. It would be well also if more state associations would study the beneficial results obtained where the industrial-arts teachers meet with the vocational teachers in convention. The two activities ought to work together in harmony for the betterment of both.

SIMPLICITIES AND COMPLEXITIES IN INDUSTRY

In the March, 1945, issue of *Mineral Industries* there is a short statement which says that to make a ton of steel, one needs 2800 pounds of iron ore, 16,000 pounds of air, 480,000 pounds of water, 87,000 cubic feet of gas, 1600 pounds of steam, 1500 pounds of steel scrap, some fluxes, alloys, refractories, electric power, sulphuric acid, muriatic acid, fuel oil, and pitch, a furnace capable of furnishing 27,000,000 B.T.U., and a lot of know-how.

This is just a sample of what the worker is required to know in industry, to say nothing of what he must be able to do before a ton of iron which most people look upon as common and of little value can be produced.

The foregoing statement also furnishes a pat illustration for instructors of industrial arts and vocational education which they can lay before some of their academic friends who think that all that a mechanic needs is a pair of fairly skillful hands and a strong back.

THE SEMESTER TEST

The end of the first semester is approaching. Have you prepared for a final examination or test? Like many shop teachers, you may feel that your judgment of a student's work is a sufficient basis upon which his grade may be founded. You may be right, but it is well, even under those conditions, to use a test to check your own conclusions.

If you are antagonistic to objective tests, use the essay type, but be sure to use some kind of semester check on your own and the student's work.

Now is the time to prepare that test. See past issues for helpful material.

Education Confused

GEORGE K. WELLS
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We have been listening for some time to the rather heated arguments as to how people can be taught to think. The apostles of the liberal arts schools and colleges have a method, which to say the least, shuns all contact with the vocational schools. It would seem that the attempted marriage of vocational education and cultural education will be sabotaged by the academic school of thought.

After all of Professor Dewey's discussions on how we think, we still persist in ruling out the material things of life as a contribution to education in how to think.

Recently we listened to an eminent educator say on the radio that the boys should be taken out of the last years of high school and sent to college because they learn so much that is not good in those years. A few years ago the definition of a person who completed his doctor's degree and secured a position to teach in a college was that he was the kind of a person who could not secure a job when he had completed his first or bachelor's degree. Who can prove that the college teaching will be better than the high school variety.

The Greeks despised hand labor in ancient times when a philosopher held pebbles on his tongue to help him stop stuttering. Luther talked about giving a practical education to boys and girls for quite a while before anything was done about it. Rousseau wrote about an imaginary child but did not take any action. We are merely trying to suggest that it takes action with material things to change discussion into achievement.

Let us bring the discussion nearer to date. Hitler did a lot of thinking and talking before he got action, but this action depended on the training in many vocations for the temporary success he achieved. There seems to have been plenty of people talking and thinking in terms of preparedness in England and in our own country, but the satisfactory conclusion of World War II was brought about only because we had, or developed, the technical skill to produce armament faster and better than did the Axis.

Out of the historic past can be cited many examples of great thinkers who are often quoted. It was Edison who invented the electric light; how often is he quoted? We cannot find from what college the Wright brothers or Glenn Hammond Curtis were graduated, but their thinking and action in years past laid the foundations for the victory the Allies won over the Axis.

Let us have clear thinking, by all means, but let us investigate carefully as to whether thinking without skill of action will reward us in government, in economics, or in the mechanical field. Let us judge carefully as to whether abstract thinking, or thinking and experimenting will accomplish our purpose best. Shall we first spend four years learning to think and then try to experiment with our conclusions, or shall we experiment a little with a few conclusions and discard the poor ones before we make new ones?

We have heard many graduates of colleges discuss their college experiences. More often the discussion was in terms of people who had impressed or depressed them, than in terms of their changed ability to think.

During the depression a graduate of Yale applied for a job as a printing instructor in the public schools. His only qualification which he advanced was that his father ran a print shop and he had grown up with the work. While he did not get the job, his training for it came more from the father's print shop than from the college.

We exist in the very active present. We reverence the successes, material and spiritual, that have come out of the past. We believe that our success in the future depends on our action now. We see more hope for the future through the fusing of thought with action than through their divorce.

Industrial Arts Looks Ahead

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The ravages of war have been many and far-reaching. The effects of war have been and still are being felt by the schools. Due to the increased demands of industry for greater production, the industrial-arts teachers were expected to incorporate into their planning a program known as pre-induction training, which consisted of including instruction in many mechanical skills which might be of assistance in the training of high school boys for entrance into the war industries, and subsequently into any of the skilled divisions of the army or navy. But as this demand increased, there developed an acute shortage of industrial-arts teachers. They were called by the Selective Service Act, enlisted in one of the services, or left their teaching to aid more directly with war production in one of the countless industries. The contribution made by the industrial-arts programs within the public schools suffered because of the lack of qualified teachers.

Even though the Selective Service Act entitled a teacher to return to his old position and to resume his profession where he had left it prior to entrance into the war, there is at present a greater shortage of industrial-arts teachers than ever. The schools of the United States are experiencing, and will continue to experience, a dire shortage of qualified teachers for the next decade. This unwanted situation has been created because:

1. Some of the teachers called into service will never return.
2. A few of the men who had reserve commissions will prefer to remain in the army or navy.
3. Others have become interested in staying with industry.
4. Quite a few are venturing into the business world on their own.
5. A negligible number of new teachers was trained during the past four years.
6. Many schools which did not have industrial-arts departments before the war are now adding them.
7. Most of the schools which did have departments are expanding their offering to twice their previous schedules.

8. Elementary schools are adding handcrafts to their curriculums.

The past five years was a period of great importance in the development and promotion of industrial arts because of the increased emphasis placed on skilled technical training. One of the reasons which has caused the United States to think more industrially than ever before has been the trend to industrialize the great Southwest. This trend has also brought an influx of industrially minded people from other states. Many towns and cities had equipment and tools loaned to them for the intensive war training programs. At the conclusion of the emergency training these schools had the opportunity to retain much of this excellent equipment, provided that they continued with a vocational-industrial program. Since there are many hours during the day when such programs are not in operation, the shops could be available for industrial-arts instruction and more of this type of work should be planned.

Many school superintendents and supervisors of industrial-arts are also taking advantage of surplus war equipment which is available for the packing and transportation costs. The field of industrial-arts teaching promises to be a most interesting profession for those who are wondering about its future. A number of the smaller centers are looking forward to promoting and developing combination programs of industrial-arts and diversified occupations. There will not be any room for the old line *manual-training* instructor who wishes to teach only woodworking. The trend is definitely toward the generalized program with much more emphasis upon planning, and to include work in the many other materials such as the various metals, alloys, plastics, etc.

Those who are teaching industrial-arts will find it decidedly advantageous to do constructive reading, visit industries, and to exchange ideas with fellow members of professional organizations, such as city and regional industrial-arts clubs, the state vocational and industrial-arts associations and the various state teachers associations. All of these organizations have meetings or conventions at which time ideas are exchanged for the mutual benefit of all those in attendance. Summer schools will again flourish for those teachers who wish to upgrade their skills and gain more information on the undergraduate level, as well as for those who are ready to work on the masters degree.

It is certainly incumbent on all progressive industrial-arts teachers at this time to take advantage of the added interest of the schools for their work, the generous amount of new equipment being made available, and the expanded programs within the school systems. The industrial-arts teacher should do all he can to encourage those high school boys who seem to possess the ability and interest in the industrial-arts field to plan to be the industrial-arts teachers of tomorrow.

Where Are Our Schools in Foreman Training?

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When we examine the actual responsibilities of the large and varied group of individuals holding supervisory positions in industry, we are impressed by the wide variety of knowledges, understandings, and skills which they must possess if they are to function successfully.

With the passage of time, our industrial society has been growing increasingly complex. The supervisor now needs to know a great deal in addition to getting out production. He needs to know, among a myriad of other things, legal provisions concerning organized labor and the union contract. He should have a basic understanding of human behavior, in order that he can solve more satisfactorily problems involving the *personalities* of workers; he needs to know the practical application of time and motion studies and the principles of industrial engineering to enable him to interpret intelligently the results to his workers. It is a necessity that the supervisor be familiar with health and safety standards.

It is not surprising, then, that the realization has been growing that foremen and other industrial supervisors need some sort of formal training to assist them in performing their difficult and manifold duties. There can be no substitute for on-the-job learning, but there is no reason why foremen should not be assisted, and new candidates prepared before assuming foremanship duties. It seems, however, that management generally has failed to embark on a long-term, planned program of development. The schools have similarly been neglecting an important field of public service.

The recent war brought to sharp focus the personal frictions, losses, and other difficulties arising out of the mushroom growth of industries in which unqualified, and more often, inexperienced and untrained persons were thrust into supervisory positions. It would, nevertheless, be a mistake to assume that the problem of scientific foreman selection and training was only temporary, and began and ended with conditions incident to the war. As might be expected, many of the larger industrial establishments have developed effective personnel departments where the findings of psychology and scientific studies are employed. One of the matters that has received attention is the upgrading and in-plant training of supervisors. The war made more clearly evident the critical need of adjusting newcomers to supervisory positions. The present and future needs in this area are certain and continuous, even though they be less spectacular than before.

The field of supervisory training may be said to be still in its infant stage, although as will be shown, it has had a substantial beginning. It is a matter of regret that our public schools have had, up to the present, so small a share in this growth. The preoccupation of public education with a number of other responsibilities has led industry to depend on itself or other agencies for aid in solving its problems. The schools, moreover, too often have made little effort to dispel the old assumption that teachers generally are stilted academicians of negative personality, and with limited understanding of industrial matters.

With the outbreak of the war and the growth of foremanship problems to critical proportions, industry, state departments of education, vocational training centers at universities, the United States Office of Education, Y.M.C.A.'s, trade associations, army centers, and other groups, all made

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efforts to organize material and methods for training foremen and adjusting them to their duties. Many of these attempts provided training on a *conference* basis. This method has the inherent weakness that it assumes the learners to possess already a background sufficient to permit discussion on a relatively high basis. There is further the danger that a conference will tend to a discussion of means of solving specific problems or settling incidents, rather than permitting the foreman to develop a point of view and acquire the techniques which underlie competent supervision.

In 1941 pressure from industry led Paul McNutt, the War Man Power Commission Director, to set up a Training Within Industry (T.W.I.) organization under the Federal Security Agency. After some experimentation, a ten-hour course in *Job Instructor Training* was offered. This did not prove to be sufficient, and other ten-hour courses were added, like *Job Methods Training*, *Job Relations Training*, and *Program Development Training*. These short-term expedients proved to be very useful and worth-while emergency measures. According to many persons, however, they did not go far enough, and were too brief to produce as great a result as might be hoped. Certainly there cannot be developed professional concepts of any great depth within a period of ten hours. Bradford[1] observes: "Supervisory training in the past has not gone deeply enough into the basic problems of supervision. The preaching of the need for the supervisors to acquire desirable personality characteristics left them with the desire, but not the knowledge of how, to reach this personality perfection." There must be a comprehensive program instead of isolated courses.

It is interesting to observe that school people were at the outset distrusted as being inadequate teachers for these T.W.I. courses. Individuals were recruited from industry to give instruction and issue certificates. Later a few school teachers filtered into the work, achieving creditable success. It was at first felt that shop instructors were the most desirable recruits, but later experience showed that classroom teachers also produced excellent results.

Even educators at this time lacked confidence in their own people as teachers in foremanship training programs. Young,[2] supervisor of vocational industrial education in Baltimore, writing in 1941, says: "Our greatest need at present is for men capable of leading conferences in the various types of training required."

Aside from experience with teachers as successful instructors of T.W.I. courses, wartime conditions led to their absorption by industry as personnel and supervisory training officials. Industry seemed at first skeptical of the capabilities of school teachers in these capacities, but were forced to experiment with them as recruits in a field hard hit by man-power shortages. Many industrial leaders have, as a result of this showing, changed their attitude from that of skepticism to one of enthusiasm, and now consider the teaching field as one of their basic sources. Planty,[3] training director at Johnson and Johnson Co., speaks of the capabilities of teachers without reservation: ". . . Ancient prejudice against academically trained men and women is vanishing. In case after case, school teachers, after a few months of training and experience, are making records which management never thought possible." He points out the value of the modern teacher's training in testing, interviewing, vocational guidance, and knowledge of individual differences and human behavior, coupled with his intelligence, personality, and classroom reasoning, in providing a fertile basis for success in industrial-personnel fields.

Now that the T.W.I. program has gone out of existence, its functions need to be carried on and expanded. There is no reason why more of this should not be conducted by local vocational education authorities, since funds are made available for supervisory training programs under the basic provisions of the Smith-Hughes Law of 1917 and its subsequent amendments. This is being done in several districts, but the surface has barely been scratched. Educational administrators should take the initiative now while the need is still clearly recognized by industries. It might be argued that industrial supervision training is best conducted, in normal times at least, by the industries themselves. This may be true in large industrial organizations, but this overlooks the wide field represented by small organizations employing, perhaps, five supervisors or less. These assuredly are not in a position to set up their own training programs. There is no reason why there cannot be organized classes for industrial supervisors numbering preferably between 12 and 20 members, meeting during working hours or in the evening, and housed in the plant itself, in a schoolroom, or in any other convenient place. The schools can assume the initiative in surveying local needs, confer with management and labor on aims and plans, develop instructional material, and provide competent instructors. It need not be assumed that supervisory training is a function of schools and management that is apart from, or unfriendly to, the workers and labor unions. The competent foreman must recognize each workman as an individual with rights, feelings, and ambitions. Courses similar in nature and content to those suitable for foremen have been organized for shop stewards, with promising results.

Instructional content for supervisory training must, of course, be adapted to local needs. It is surprising, however, how much has already been made available for profitable consultation by persons organizing such activities. Planty[4] has compiled an annotated bibliography of selected available material in supervisory training. The sources which he lists are chiefly from industrial organizations, state departments of education, universities, navy yards, and army centers. One of the writers[5] was assigned to the Philadelphia School District in 1943 under war production funds to supervise the development of instructional material in supervisory training and to prepare instructors to teach the courses. Out of this work were completed a series of courses. The basic course entitled *"Supervision in Industry"* consists of 15 two-hour units. The meetings are informally conducted, the activities consisting of the development of a topic under the leadership of the instructor, discussion, and an opportunity to review the unit from the previous week. Supplementary notes representing the contribution of leaders in the field of industrial supervision are available for distribution and further reading. The 15 topics in the basic course are:

1. The Supervisor's Job
2. Personal Characteristics of Successful Supervision
3. Modern Industrial Organization
4. Requirements Essential to Efficient Organization
5. The Supervisor — A Manager of His Own Department
6. Fitting People Into Jobs
7. The Supervisor as Instructor
8. Development of Understudies
9. The Supervisor and Production
10. The Supervisor and Time and Motion Study
11. The Supervisor and Safety
12. The Supervisor and Planning
13. The Supervisor and Morale
14. The Supervisor and Labor Unions
15. Self-Analysis

Other courses, twenty hours each in length, include:

Human Relations for Industrial Supervision
Supervisor and Safety — Health
Economics for Industrial Supervision
Time, Motion Study, and Wage Incentives
The Supervisor and Labor Problems
The Shop Steward and Labor Problems
The Psychology of the Worker
Shop Sketching and Blueprint Reading
Mathematics and Use of Standard Instruments

[1]Leland C. Bradford, "The Future of Supervisory Training," Personnel, 22, July, 1945, p. 6.

[2]Karl H. Young, "Foremanship and Supervisory Training," *Baltimore Bulletin of Education*, November, 1941–January, 1942, p. 75.

[3]Wm. McCord and Earl G. Planty, "Teachers as Recruits for Personnel Work," Personnel, 20, May, 1944, p. 327.

[4]Planty, Earl G., "Newly Designed Tools for Supervisor Training," INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, January, 1945, pp. 2–4.

[5]Richard W. Hartmann.

The introduction of a successful supervisory training program is beset with significant, but by no means insuperable difficulties. Enthusiasm, support, and participation must be enlisted from management and labor. They must assist in deciding needs and agree that the course content is worth while. Industry must see to it that persons having the proper intelligence and personal characteristics be chosen for admission to the courses. The instructor must be a competent teacher, understand industrial and labor problems, be able to meet the foremen trainees on their own ground, be alert to their needs, and have enthusiasm and confidence in his teaching. Such courses need not be *dry* and open to the charge of being *canned*. As mentioned earlier, the aim of such courses ought not to be the solution of individual in-plant crises, problems, and situations on a conference basis. It seems preferable, rather, that supervisory training be aimed toward professionalizing foremen, by giving them an understanding of their responsibilities, and preparing them with sufficient psychological and industrial knowledges to solve their own problems.

The moment, need, funds, and opportunity are at hand. Now is the time for public education to accept the opportunity for broadening its field of service to industry.

Problems and Projects

A COURSE IN PLASTICS

FRANK D. DOLAN and HAROLD A. SCHULZ
Ordnance School
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(Continued from page 466 of the December, 1946, issue)

Cementing

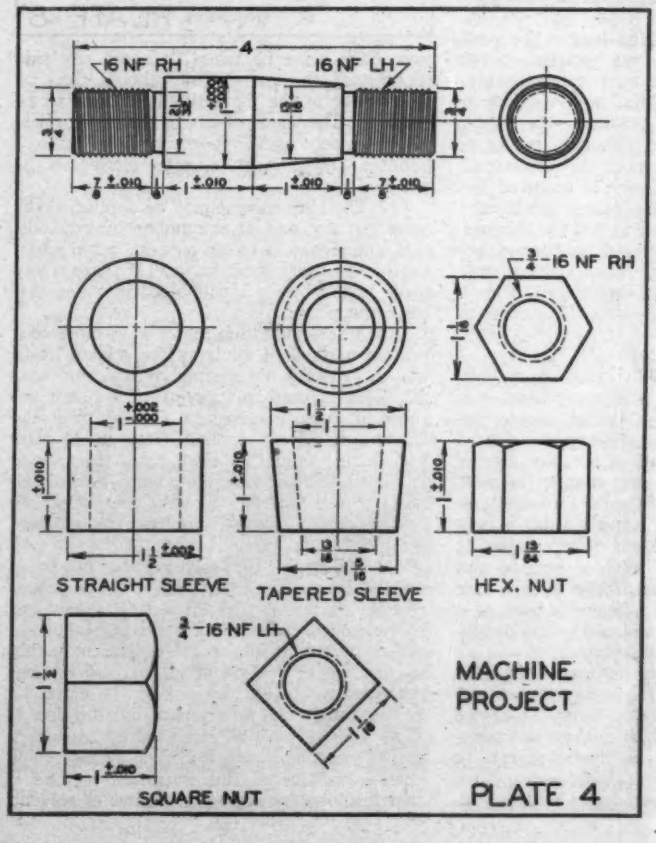
Plastic surfaces may be cemented by a process that resembles welding more than it does cementing. Two different methods may be used but in each case the cementing is accomplished by a fusion of the two surfaces. The actual process is quite simple. First a solvent is applied to the surfaces to be joined. The solvent dissolves the surface material and forms a dense solution. The surfaces are brought in contact with each other. They fuse. The solvent evaporates leaving one solid piece and a transparent joint.

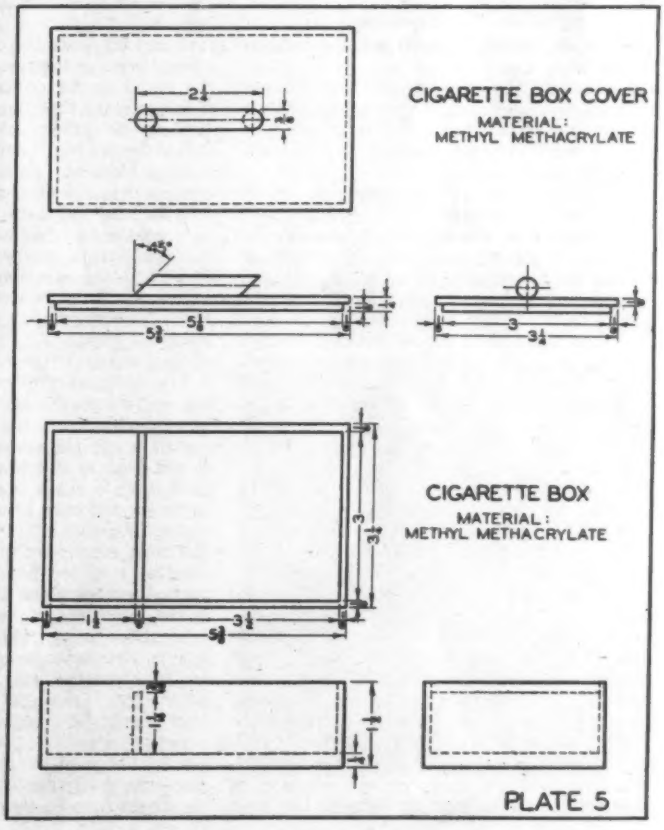
1. *Preparation* — It is extremely essential that proper preparations be made before any cementing is attempted.

a) Joints — The joint to be cemented must be made to fit *freely*. Each surface must have the same contours and care must be taken not to force either piece out of line. Otherwise crazing may develop.

b) Cleaning — Surfaces to be cemented should be machined or sanded smooth. They should then be wiped with a clean cloth that has been moistened with alcohol. *Under no conditions should a solvent be used for cleaning.* A solvent will soften the plastic and make the grit and dirt harder to remove.

c) Jigs — Wood or metal jigs should be available for every cementing job. In many cases the corner of a box will make a satisfactory jig. The work should be clamped firmly in the jig until the joint has dried sufficiently. The time required for drying will vary





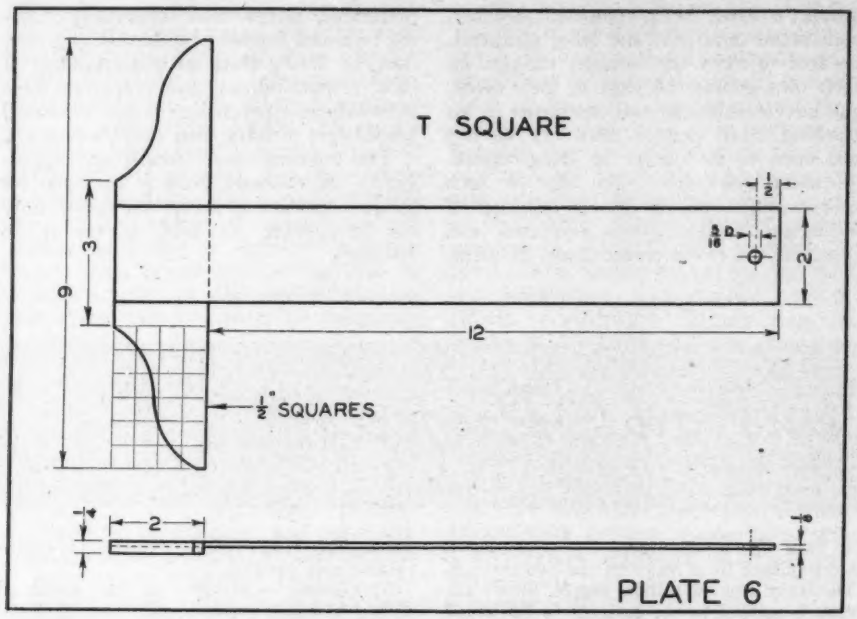


PLATE 6

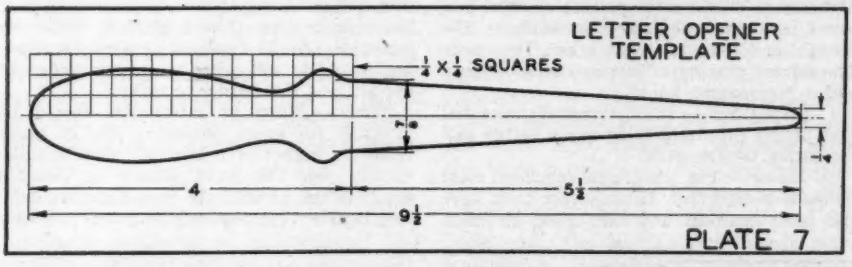


PLATE 7

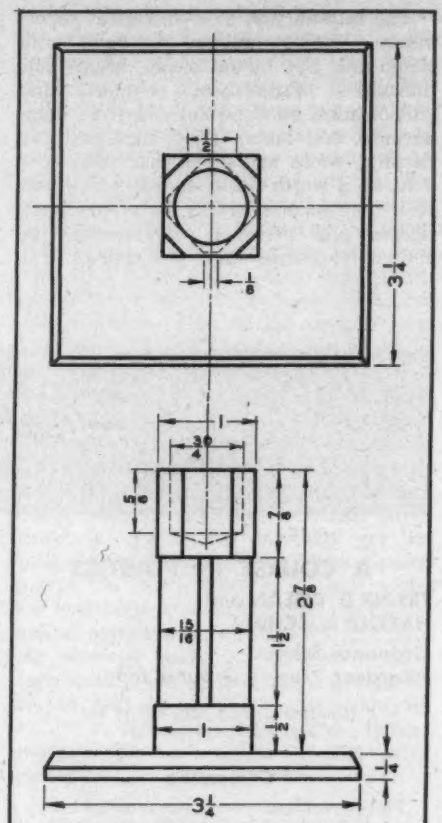


PLATE 8

with the size of the material and the method of cementing used.

2. *Methods of Cementing* — There are two basic methods of cementing: the soak method and straight solvent method. The former produces a much stronger joint.

a) The Soak Method

(1) Only methyl methacrylate can be cemented by this method.

(2) *Cement* — The cement is made in the shop by dissolving one part by weight of methyl methacrylate (clean trimmings and shavings from the machines) in 20 parts by weight of methylene dichloride. The mixture should be allowed to set 24 hours by which time the chips should be completely dissolved.

(3) *Masking* — Special masking tape should be used to cover all of the parts to be cemented except the edges which are to be joined. About 1/32 in. should be left uncovered along the edges.

(4) *Soaking* — Enough cement should be poured into a tray to cover exposed surfaces. The parts should be allowed to soak from 5 to 20 minutes depending on the size of the joint and the thickness of the plastic.

(5) *Assembly* — During the soaking, the exposed surfaces become soft and spongy. When they are brought into contact the softness of the plastic will in some measure compensate for slight differences in the contours of the mating edges. After the two parts have been pressed together, the surfaces intermingle thoroughly to form a strong transparent joint when dry. It is because of this extensive intermingling that the soak method produces a stronger joint. The interval between the soak tank and the assembly of the joint is the most critical point in the cementing operation. Since the liquid in the cement evaporates quickly, it is necessary that the joint be assembled in the jig as quickly as possible. The parts should be held in the jig with sufficient pressure to force out all air pockets. Any excess cement that runs out should be removed before it hardens. Once the pieces are in the jig they should be allowed to dry for 4 hours. Eight additional hours should be allowed before they are machined. Heavy pieces may take a day or more to dry although it is safe to machine them after allowing an interval of 12 to 14 hours.

b) Straight Solvent Method

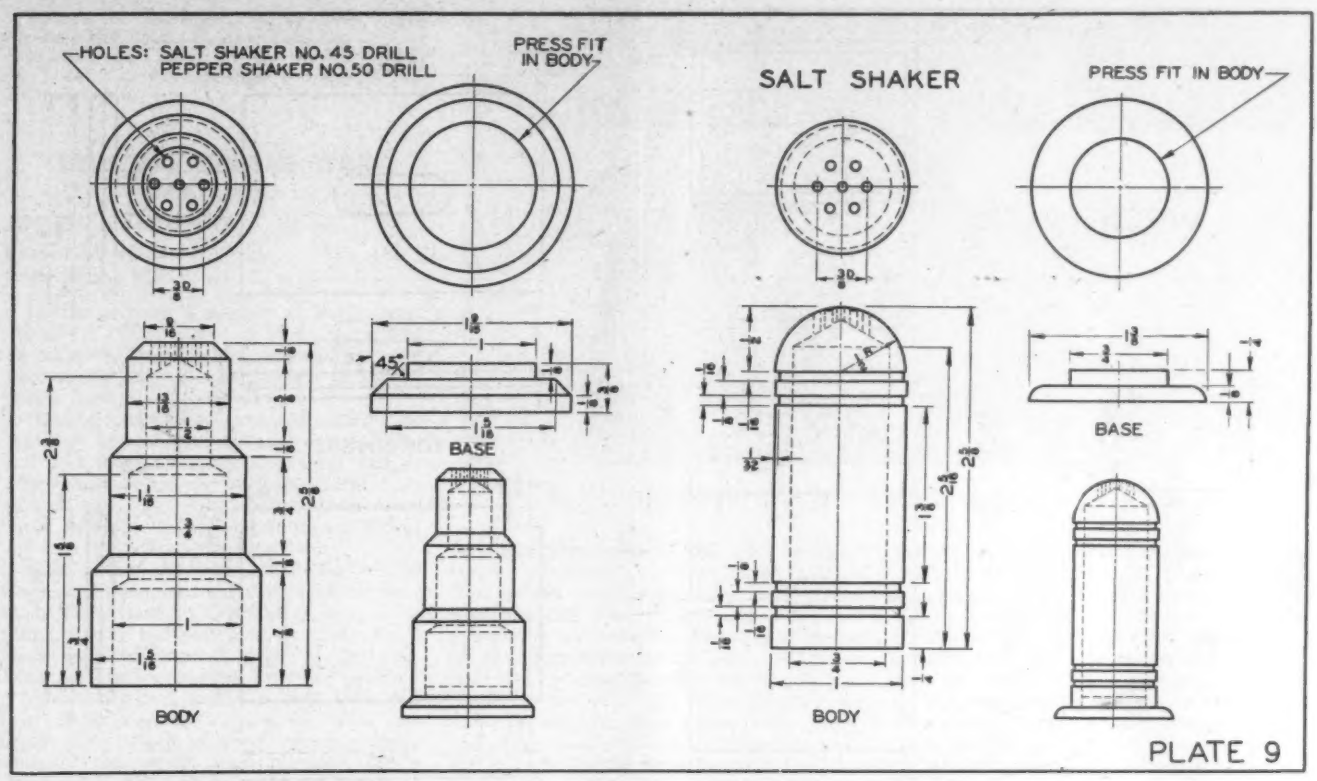
(1) Although the soaking method of joining will invariably form a stronger joint, it is also possible to cement plastic surfaces by the use of a straight solvent. The resulting joint is not quite as strong as that obtained by the soak method but it is strong enough for most purposes and may be machined almost immediately. Because of its simplicity it is, in fact, the most convenient method of cementing. It can be used for both cellulose acetate and methyl methacrylate. The process in each case is the same except that acetone is used as a solvent for the acetate, and methylene dichloride is used for the methacrylate.

(2) After the individual pieces have been finished and the contacting edges prepared, they should be assembled in a jig. To insure penetration and to avoid air pockets one member of the joint should be tipped slightly to one side until the solvent has been applied. It should then be retipped to its proper position. Care must be taken to avoid any side slipping of the parts. They should then be held firmly in the jig until dry enough to be removed. The speed of drying is very surprising. In most cases it won't be more than 3 minutes before work on the piece can be resumed.

(3) The pure solvent may be applied at the joint by any one of a number of methods. One simple way is to use a ¼-in. camel's hair brush. The brush must be new. If there is any paint in the brush it will bleed into and discolor the plastic.

(4) A second, and in many ways more convenient method of applying the solvent, is to use an ordinary hypodermic syringe and needle. This method is superior to a brush because it permits absolute control over the amount of solvent applied. Only an all glass hypodermic should be used. After the syringe has been filled the needle should be pointed upward and all the incased air should be forced out. This will prevent the solution from dribbling.

(5) To apply the solvent, the needle is merely drawn along the joint and the proper amount of the solvent ejected. The flow can be controlled either by pressure on the piston rod or by the expansion of the solvent within the syringe as a result of an increase in temperature caused by the heat of the hand. If, in the latter case, it is found that the flow is insufficient, it may be increased by drawing a small amount of air into the syringe. The chief advantage of this expansion method is that it allows for a more even flow of solvent.



It is recommended that water be used while practicing this method. Any old discarded syringe and needle can be used.

Forming

When thermoplastics are heated to the proper temperature they become pliable enough to permit their being formed into almost any shape. This operation must be performed without undue delay because plastic materials have a *memory* and tend to return to their original forms unless they are heated sufficiently, held firmly, and chilled rapidly.

1. *Jigs* — Wherever possible jigs should be used. They may be of either metal or wood and should be covered with a soft flannel cloth to prevent the grain of the wood or marks on the metal from showing in the plastic. When a three-dimensional form is desired a male and female jig should be used.

2. *Methods of Forming*

a) Hot water — The acetate — *but not the methacrylate* — may be made pliable by dipping it in water that has been heated to 210° F. It should be left in the water until it is soft enough to bend. It should then be removed from the water, placed in a jig immediately, and chilled by the use of cold water or a fan. *Caution:* If the acetate is put into water that is still boiling it will become opaque.

b) Dry heat — Both the acetate and the methacrylate can be formed by this method although of the two, the latter is best suited to forming no matter what method is used.

(1) *Oven* — Any dry heat oven is suitable. Even a kitchen range can be used successfully if it has a heat regulator or a heat indicator. The acetate becomes pliable at 160° F. and the methacrylate at 240° F.

(2) *Quenching* — When the plastic is removed from the oven it should be waved through the air momentarily to chill its outer surface by air quench. It should then be placed in the jig at once. This air quench is necessary in order to harden the surface and prevent *mark-off* by the surface of the jig. After the plastic has been placed in the jig it should be chilled as rapidly as possible in order to relieve the stresses set up by the cooling. Otherwise *crazing* will develop. Crazing is the formation of little fissures in the surface.

Using a bending jig

Stress Relieving

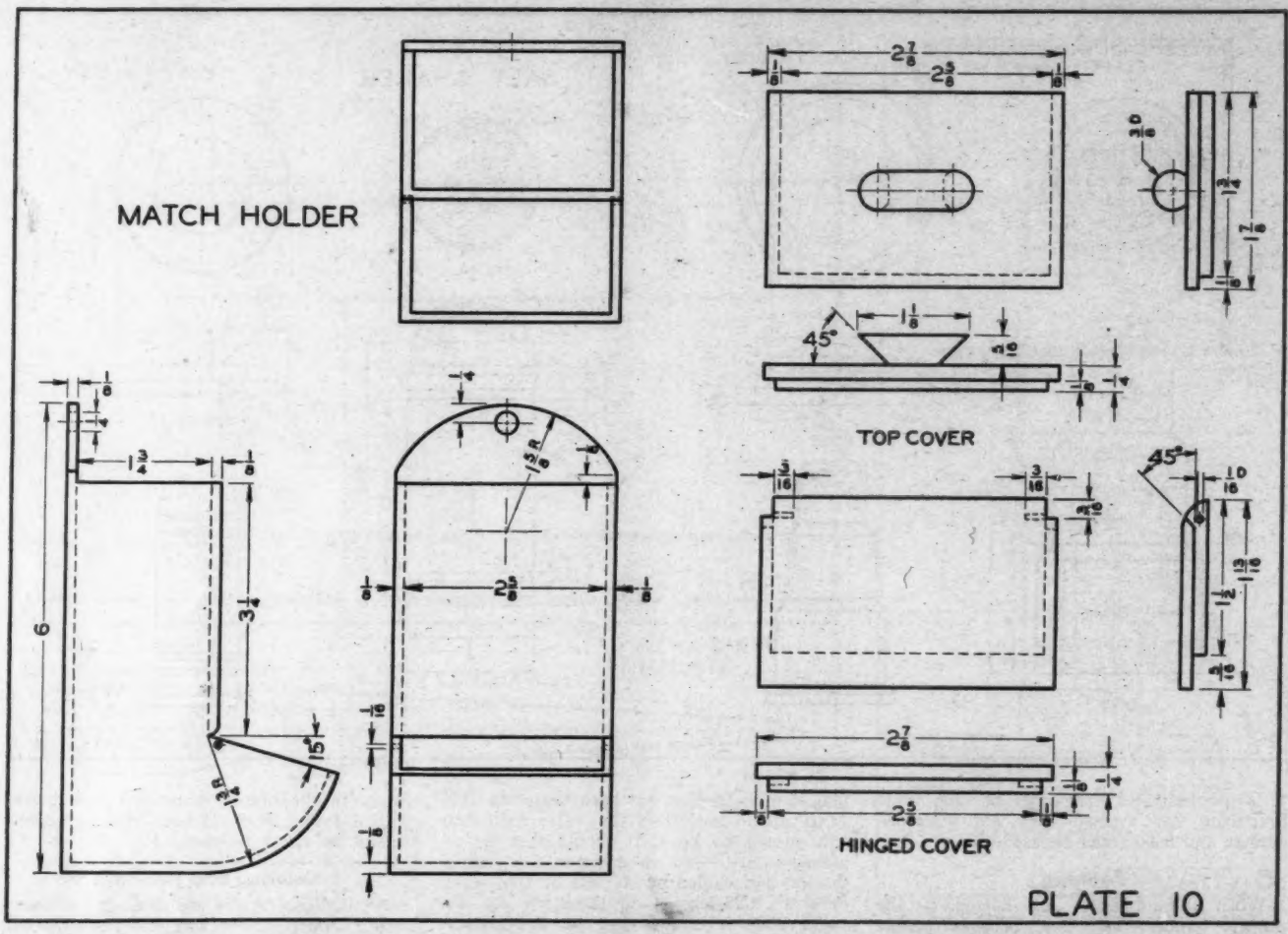
In the fabrication of methyl methacrylate there are many operations which cause stresses to be set up in the plastic. Stresses in metal or wood may have no visible effect but with plastics there is a tendency to *craze*. This tendency may be overcome by baking the article in an oven that has been heated to a temperature of from 140 to 160° F. When the entire object has reached the desired heat it should be removed from the oven, held firmly in the proper shape and then cooled with a forced draft of air. Cellulose acetate cannot be stress relieved.

Coloring and Finishing

A number of dyes are available commercially. Directions for applying the dyes will vary with the manufacturer. The process is usually quite simple and very effective because the plastic surface absorbs the dye and cannot be rubbed off.

The appearance of the final product will in large measure depend upon the care taken in the finishing. Two buffing wheels are needed. The first is dressed with a special mixture of white rouge and tallow, applied sparingly to avoid overloading. This wheel is used for polishing. The second buffer — dry and clean — is used to make the surfaces glossy. During

Buffing and polishing

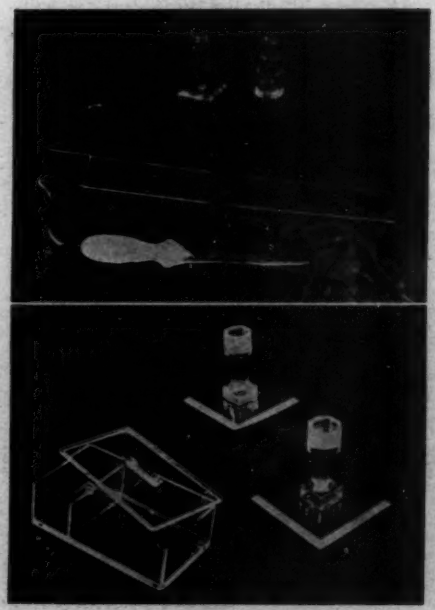


the buffing operations it will be necessary to keep the plastic constantly in motion because undue pressure or prolonged pressure will result in overheating. These buffing wheels should be used only for plastics. After the finished job has been buffed it may be waxed either with auto wax or with one of the several plastic waxes that are available commercially.

For sources of supply write to Advertisers' Products and Service, care of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, 540 North Milwaukee St., Milwaukee, Wis. Make use of the coupon on page 35A.

Schedule

Elements of plastics — 6 Hours
Triangles (cellulose acetate) — 2 Hours
Fabrication of soapbox (cellulose acetate) — 8 Hours
Fabrication of notebook (cellulose acetate) — 6 Hours
Forming rings — 2 Hours
Fabrication of picture frame (methyl methacrylate) — 8 Hours
Coloring — 1 Hour
Soapbox or supports on picture frame — 7 Hours
Finish any work remaining, or design and complete a problem. Sample problems designed by students: Letters of name to place on notebook. Cover for wedding cake decorations. Watch band. — 6 Hours
Lathe — Lathe problem turning shaft with tapers, etc. Sleeve blank. — 8 Hours
Lathe — Threading and boring the foregoing — 8 Hours
Milling Machine — Mill square and hexagon nuts — 7 Hours



Plastic projects

Milling Machine — Mill cover for cigarette box — 1 Hour
Milling Machine — Mill matchbox cover. Slot head of T square — 6 Hours.
Hand Work — Letter opener — 2 Hours
Hand Work — Candlestick holders — 14 Hours
Cigarette box and assemble T square — 8 Hours
Lathe and drill press — Make one pair of salt shakers — 8 Hours
Fabrication of matchbox — 8 Hours
Students design and fabricate from own drawings; rings, jewelry box, pocket cigarette box, cribbage board, pegs, etc. — 8 Hours

REFERENCES

The fabrication manuals put out by the E. I. DuPont de Nemours & Company and by Rohm & Hess Company, Washington Square, Philadelphia, Pa., are indispensable. The following publications will be found to contain considerable information of value to the industrial-arts instructor who wishes to learn more about the processes used in industrial production.

Plastics Catalogue, 122 East 42nd St., New York (17), N. Y.
Hand Book of Plastics, by Herbert R. Simonds, D. Van Nostrand Co., 250 Fourth Avenue, New York City.
Industrial Plastics, by Herbert R. Simonds, Pitman Pub. Co., New York City.
Plastics — In the School and Home Work Shop, by A. J. Lockrey, D. Van Nostrand Co., 250 Fourth Avenue, New York City.
Plastics, by J. H. DuBois, American Technical Society, Chicago, Ill.

Plastics for Industrial Use, by John Sasso, McGraw-Hill Book Co., New York City.

Molding and Casting, by Carl D. Clark, John D. Lucas Co., Fayette, East and Laurel Sts., Baltimore, Md.

UTILIZING SURPLUS WAR MATERIAL

JOSEPH J. LUKOWITZ
Brown Street School
Milwaukee, Wis.

Having received a number of bronze rings about 4 in. in diameter, 3/16 in. thick, and ¾ in. wide, from surplus war material, we were confronted with the problem of how to utilize them in our shopwork.

Past experiences have repeatedly shown me that boys have original and constructive ideas, and that they can create acceptable designs when they are given units to assemble in various ways. This building the whole from parts develops their originality — a logical and effective educational procedure.

After telling the boys about the bronze rings, they were given a demonstration of how easily a ring could be converted to other basic forms. A ring was placed in the vise with a block of wood inserted inside of the ring. When the vise was tightened the ring assumed a form having two parallel straight sides and two curved ends. By varying the width and length of the block of wood, various proportions of this design were obtained. Other forms, all useful in project design development, were produced by using the vise to straighten portions of the ring.

The boys were by this time suggesting uses for these forms such as, ash trays, parts of lamps, candlesticks, and flowerpot holders. Next we cut a ring open, straightened it, and flared one end. Then we annealed it and bent it cold into a scroll form. Boys almost immediately suggested using the scroll in connection with the ring, or other forms produced from the ring, for still other designs that could be used for desk lamps, table lamps, wall lamps, candleholders, and flowerpot holders. Interest by this time was intense. Other scroll forms of different proportions were produced and their possibilities discussed.

After producing a number of basic forms from the rings it was then demonstrated how easily the surface and the edges of the rings could be enriched by filing, shallow drilling, punching, and peening. The response to this was most enthusiastic and produced still more ideas from the pupils. In a few minutes eight or ten enrichment designs were developed. Two or three of these surface enrichment designs suggested by the pupils were immediately demonstrated. All of this is teacher-pupil planning, an effective method of teaching which can be used with variations in many other types of shopwork.

At our open house we displayed samples of the rings received from surplus war materials as shown by Figure 1. We also displayed

Fig. 1. The bronze rings received from the surplus war material

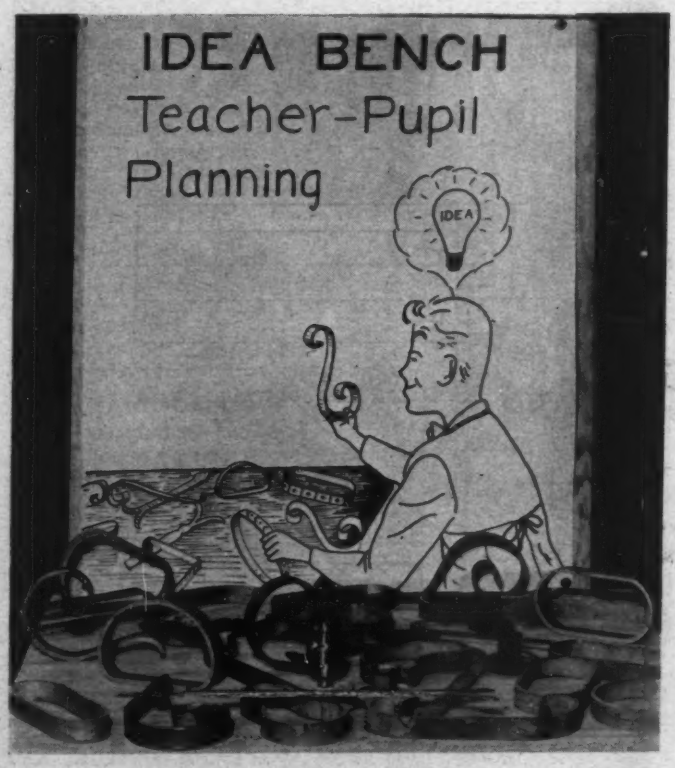


Fig. 2. The idea bench

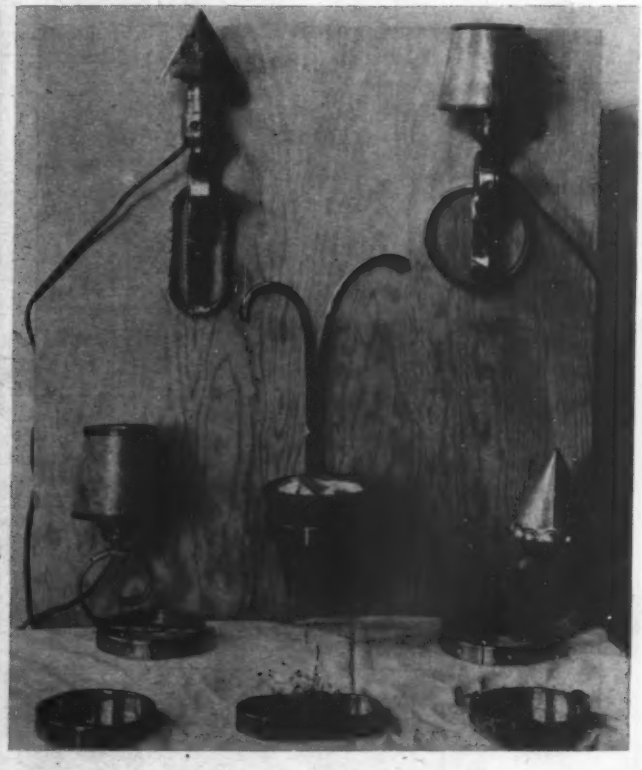


Fig. 3. Some finished projects

our idea bench which consisted of a number of rings converted into various shapes all suitable to be used singly or in combination in the production of projects. The idea bench is shown by Figure 2. This, of course, led up to an exhibit of pupil-completed projects made from the rings, a few of which are shown by Figure 3.

When you wax mahogany, be sparing with the wax, apply it *across* the grain and polish by rubbing *with* the grain.

Iron floats in mercury because it is only about half as heavy as mercury.

MODEL CONFEDERATE CANNON

GEORGE F. LARTZ

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In this article another cannon project to stimulate the interest for metalworking among the boys is described. It is a scale model of a 12-pound Civil War howitzer shown in Figures 1 and 2. This cannon was used by the confederates in opposing the batteries on Cemetery Hill in the Gettysburg Campaign. The originals were made of bronze, and a realistic effect is obtained in the final finishing by allowing the barrel to tarnish, since those preserved on the Gettysburg National Park fields are weathered green. Again, sturdy angle steel mounts are substituted for the wheels to make the project almost entirely a machine-shop undertaking. This gun will fire balls from discarded ball-bearing races, but caution must be kept in mind in loading so as not to overcharge. Powder from three ¼-in. firecrackers is sufficient when the barrel is wadded good, and a fuse about 1½ in. is used. The model shown in Figure 3 was made to the scale 1 in. equals 1 ft. by a fourth-year high school boy, and the following steps were followed:

Machining Trunnions

1. Mount short scrap stock in chuck or collet.

Fig. 1. Confederate cannon

Confederate cannon

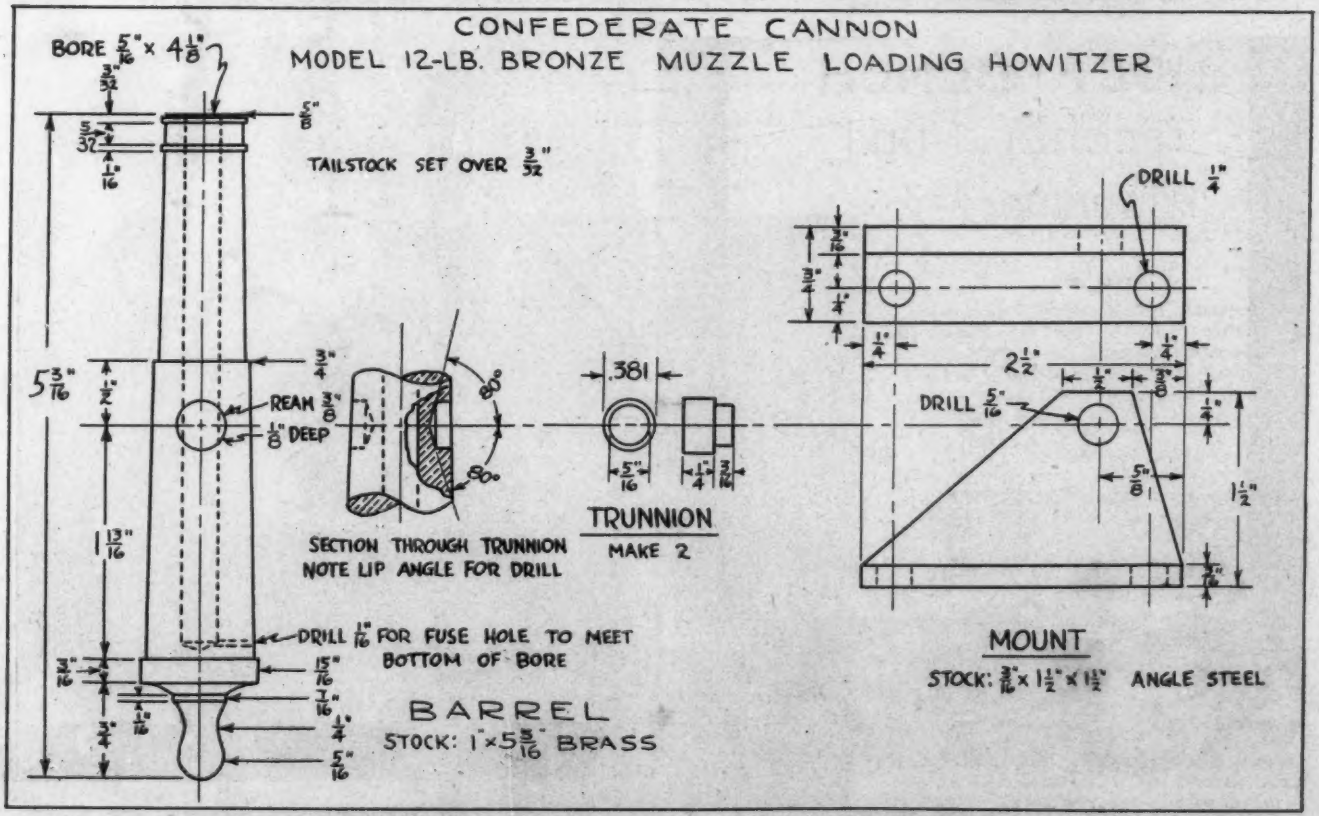


Fig. 2. Details of model 12-lb. muzzle loading Civil War howitzer

2. Turn to dimensions, polish, and cut off.
3. Reverse stock, face, polish.
4. Set aside to press into the barrel later.

Machining Barrel

1. Chuck stock in independent chuck and true up.
2. Center drill, bore out with a long set drill and ream to size.
3. Reverse in chuck and center drill other end.
4. Mount between centers and rough turn cascabel.
5. Offset tailstock for taper and turn barrel to diameters shown.
6. Face shoulders and muzzle.
7. With barrel clamped in a V block, lay out positions for trunnions using surface gauge and center punch.
8. Drill and ream ⅜-in. holes ⅛ in. deep with a drill especially ground to a lip angle of 80 deg. To start this hole make a shallow ¼-in. hole first.
9. Center punch and drill fuse hole.
10. Press trunnion pins in place.
11. Chuck in universal chuck, round up cascabel, and polish highly over all.

Machining Cannon Mount

1. Cut two lengths angle steel from bar.
2. Lay out to dimensions and rough cut.
3. Mount in shaper vise and make angular cuts to size.
4. Center punch and drill all holes.
5. Drawfile edges and clean off burrs.
6. Paint with flat black.

Making Base (Woodworking Department)

1. Cut base of walnut to size, ¾ by 3½ by 6½ in.
2. Cut chamfers.
3. Lay out and drill shallow spots for three 5/16-in. balls.
4. Lay out and drill 7/32-in. holes for fastening cannon mount.
5. Sand smooth, coat with lacquer, rub down when dry, and polish with wax.
6. Cut a strip of 20-gauge brass ¾ by 3 in., and stamp *confederate cannon* on it. Polish this plate and fasten to base with escutcheon pins.

Assembly

1. Assemble cannon mount and barrel.
2. Fasten cannon to base with four ¼ by 1-in. lag screws.
3. Pile four balls in position.
4. Turn in for instructor's inspection.

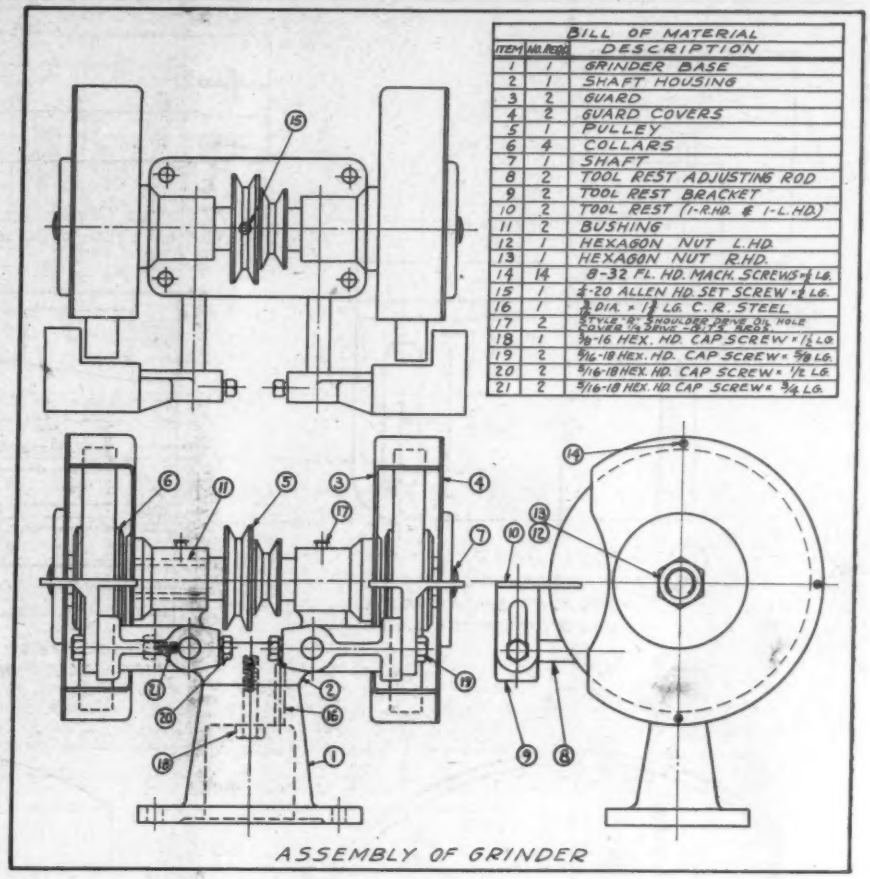
Final Check

1. Is cannon bore smooth?
2. Is fuse drilled in proper place at the base of the bore?
3. Are the trunnion pins in line, horizontally and vertically?
4. Is the cannon and base highly polished?
5. Is the cascabel symmetrical?

BENCH GRINDER

PAUL J. HATCH, Director
Vocational School
Meadville, Pa.

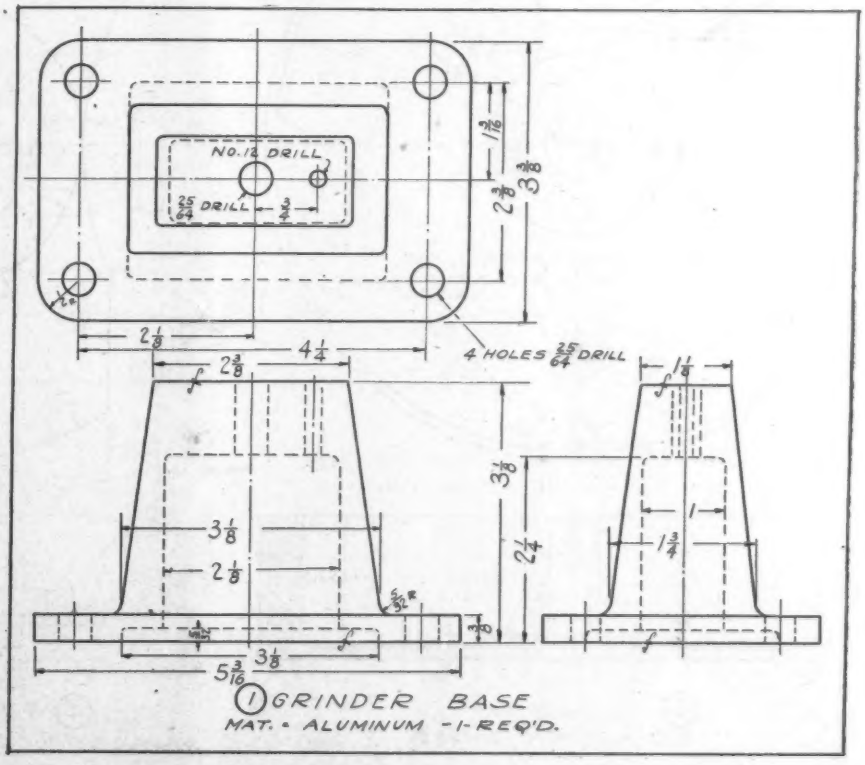
Many industrial-arts shops, particularly those classified as general shops, do not have large metalworking machine tools. It is often difficult to select projects where the required



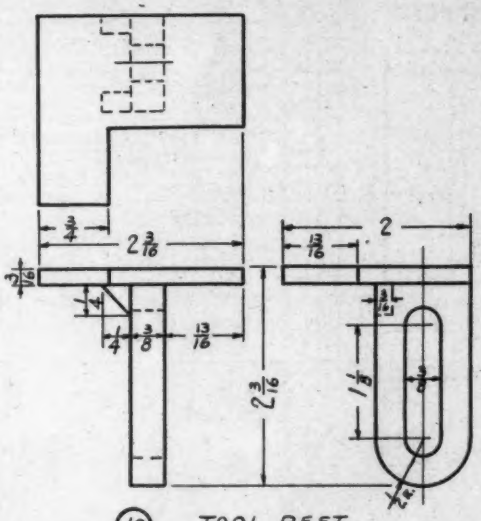
BILL OF MATERIAL

ITEM	NO. REQ'D	DESCRIPTION
1	1	GRINDER BASE
2	1	SHAFT HOUSING
3	2	GUARD
4	2	GUARD COVERS
5	1	PULLEY
6	4	COLLARS
7	1	SHAFT
8	2	TOOL REST ADJUSTING ROD
9	2	TOOL REST BRACKET
10	2	TOOL REST (1-R.HD. & 1-L.HD.)
11	2	BUSHING
12	1	HEXAGON NUT L.HD.
13	1	HEXAGON NUT R.HD.
14	14	8-32 FL. HD. MACH. SCREWS × ¼ LG.
15	1	¼-20 ALLEN HD. SET SCREW × ½ LG.
16	1	⅜ DIA. × 1¼ LG. C.R. STEEL
17	2	STYLE "B" SHOULDER PIPE OIL HOLE COVER "GARDNER-DENVER"
18	1	⅜-16 HEX. HD. CAP SCREW × 1¼ LG.
19	2	5/16-18 HEX. HD. CAP SCREW × ⅝ LG.
20	2	5/16-18 HEX. HD. CAP SCREW × ½ LG.
21	2	5/16-18 HEX. HD. CAP SCREW × ¾ LG.

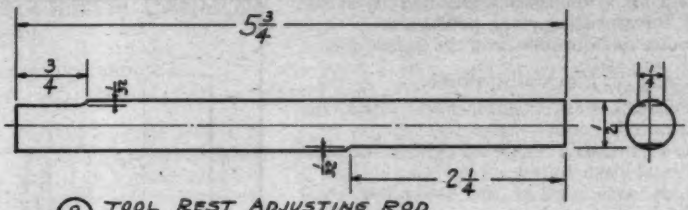
ASSEMBLY OF GRINDER



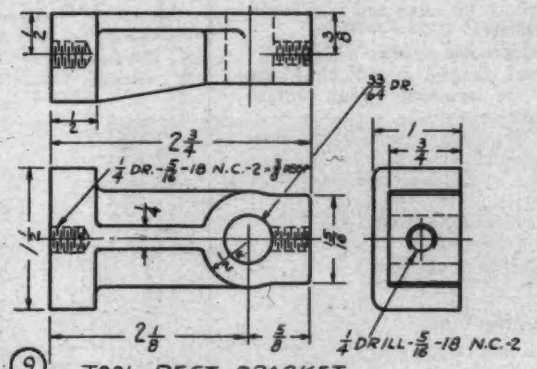
(1) GRINDER BASE
MAT. - ALUMINUM - 1 REQ'D.



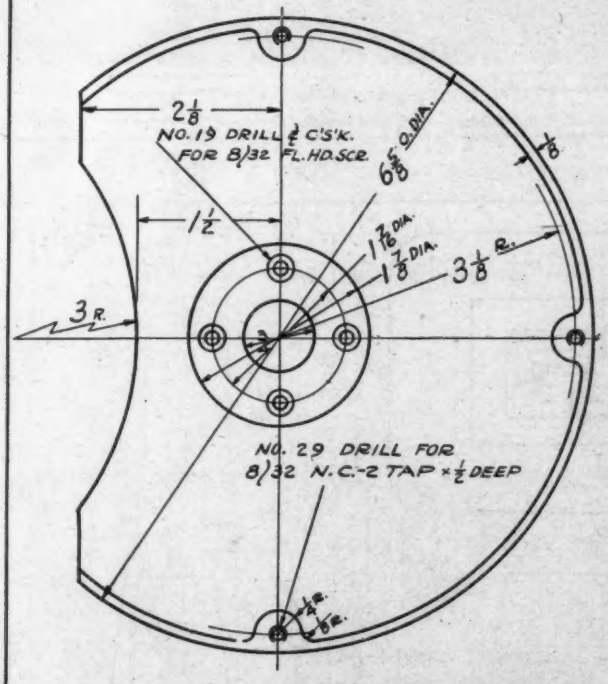
(10) TOOL REST
MAT. - CAST IRON
1-REQ'D. AS SHOWN R. HD.
1-REQ'D OPPOSITE L. HD.

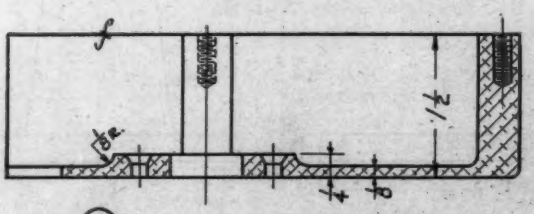


(8) TOOL REST ADJUSTING ROD
MAT. - C. R. STEEL -2-REQ'D.

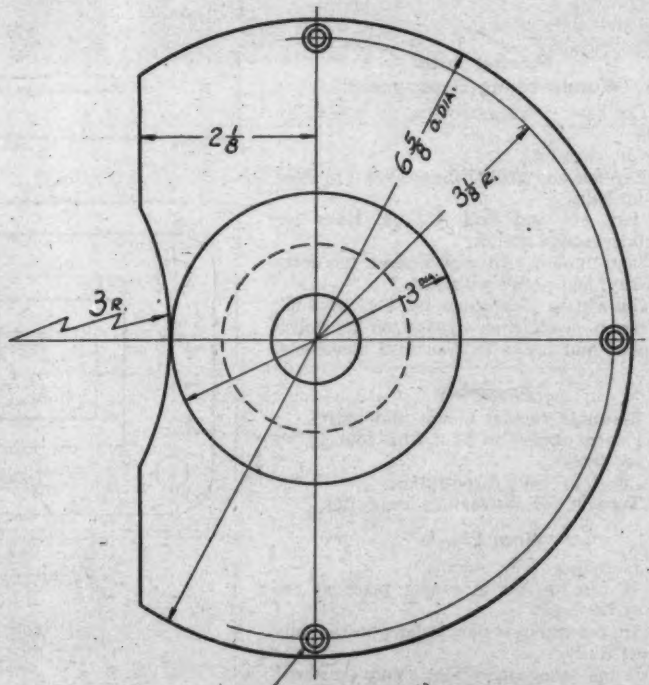


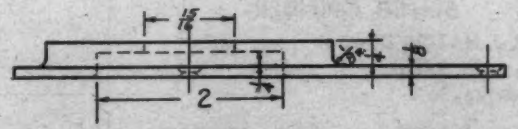
(9) TOOL REST BRACKET
MAT. - ALUMINUM -2-REQD.





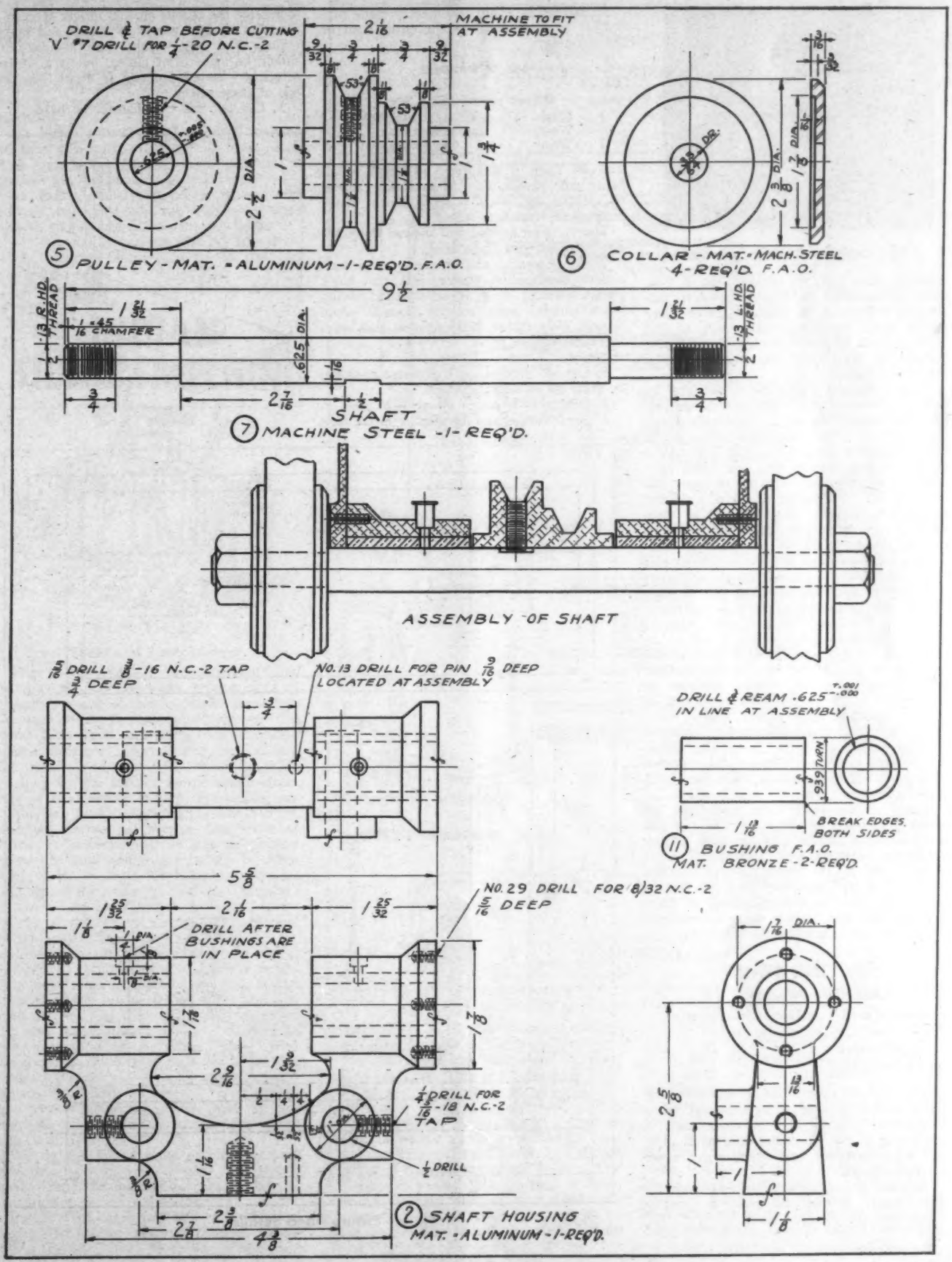
(3) GUARD
MAT. - ALUMINUM -2-REQ'D.



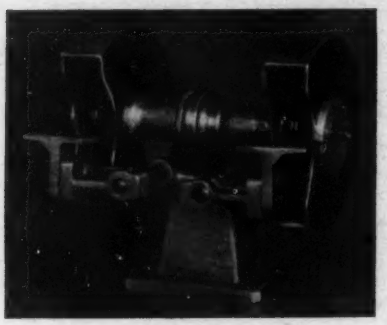


(4) GUARD COVER
MAT. - ALUMINUM - 2 - REQ'D.

Details of bench grinder


DRILL & TAP BEFORE CUTTING V
#7 DRILL FOR 1/4-20 N.C.-2
MACHINE TO FIT AT ASSEMBLY
2 1/16
2 1/2 DIA.
(5) PULLEY - MAT. - ALUMINUM - 1 - REQ'D. F.A.O.
(6) COLLAR - MAT. - MACH. STEEL 4 - REQ'D. F.A.O.
9 1/2
1/2-13 R.H. THREAD
1/2-13 L.H. THREAD
1/16 CHAMFER
.625 DIA.
SHAFT
(7) MACHINE STEEL - 1 - REQ'D.
ASSEMBLY OF SHAFT
DRILL 3/8-16 N.C.-2 TAP 3/4 DEEP
NO. 13 DRILL FOR PIN 9/16 DEEP LOCATED AT ASSEMBLY
DRILL & REAM .625 IN LINE AT ASSEMBLY
BREAK EDGES BOTH SIDES
(11) BUSHING F.A.O. MAT. BRONZE - 2 - REQ'D.
5 5/8
NO. 29 DRILL FOR 8/32 N.C.-2 5/16 DEEP
DRILL AFTER BUSHINGS ARE IN PLACE
1/4 DRILL FOR 5/16-18 N.C.-2 TAP
1/2 DRILL
(2) SHAFT HOUSING MAT. - ALUMINUM - 1 - REQ'D.

Details of bench grinder



The completed bench grinder

machine work can all be done on a 9-in. engine lathe. This should not, however, discourage or prevent the construction of many useful home workshop tools such as the bench grinder shown here. It was with this thought in mind that the grinder detailed here was designed.

Student interest cannot be maintained indefinitely, even in shopwork, without motivation. The instructor must be continually developing projects or teaching aids which appeal to varied students' interests and abilities. After all of the basic engine lathe operations have been given the student is ready to apply this knowledge in the making of useful tools and equipment. Students soon tire of the same projects such as punches, machinist hammers, parallel clamps, C clamps, and the like.

The wood patterns for the bench grinder could be made in the school shop. It was necessary to make the base and spindle housing as two separate pieces for machining purposes. The rest of the parts can be accommodated on a 9-in. lathe.

All of the grinders we have built so far have been constructed of aluminum. Gray iron castings, however, would machine up very well for this project. The tool rests, of course, should be made of cast iron or steel. The grinder will accommodate 6-in. diameter wheels with ½ or ¾-in. faces. The wheels are enclosed to prevent injury to the operator. This is a definite advantage from the standpoint of safety.

Many of the basic lathe operations are required to build this machine. There is also a considerable amount of benchwork, including layout work, required. This project is not only useful in the industrial-arts machine shop, but it also is a very good job for the vocational machine shops. Several of these grinders have been built in our own vocational shop with splendid student response.

PICTURE STAND

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Industrial and Vocational Education
Pearl River Junior College and High School
Poplarville, Miss.

The picture stand, shown herewith, was designed for the student in beginning bench woodwork. It gives him an opportunity to make use of many woodworking hand tools, use scrap material, and learn many woodworking operations.

Any wood, such as oak, walnut, cedar, red gum, poplar, or magnolia makes a beautiful frame and takes a good finish.

An attractive, easily and quickly made first project is a stimulant to the enthusiasm of the beginner.

BILL OF MATERIAL

No. of pieces	*Material*	*Size*
2	Glass	3/32 x 4¾ x 6½
1	Wood	1 x 4 x 9
1	Wood	1¼ x 1¼ x 9

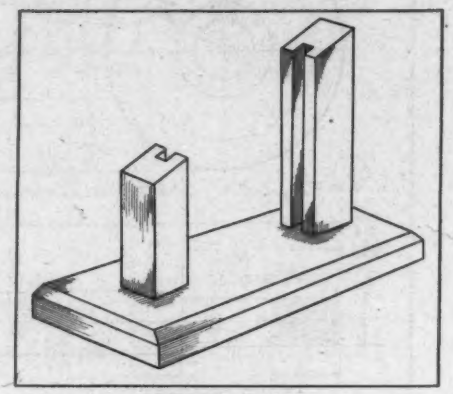
Wood filler, if required; oil stains, sandpaper, glue, shellac, varnish or lacquer, linseed oil, turpentine, steel wool, pumice stone, rottenstone, furniture wax.

The material needed will depend upon the type of wood and finish used.

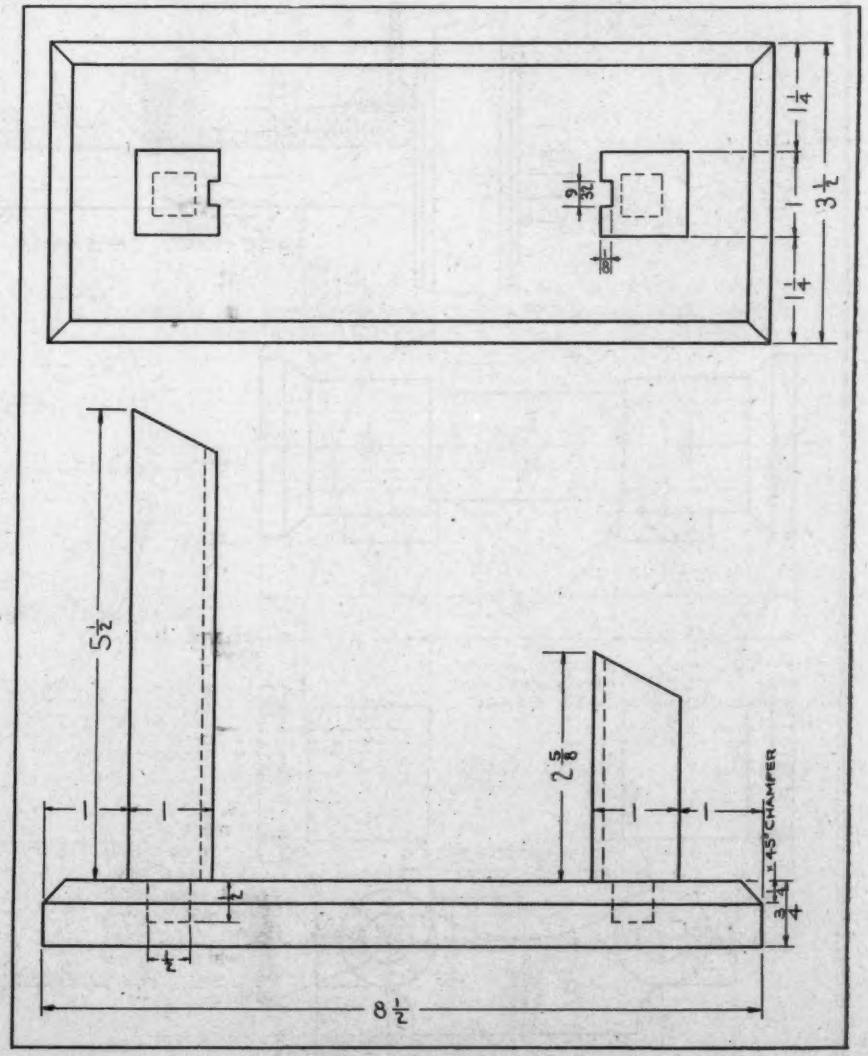
Tools: Crosscut and ripsaws, try square, and/or combination square, jack and block planes, marking gauge, T bevel, wood mallet, wood chisels, brace and bit, pencil, wood clamps, glass cutter, hand scraper, and brush for applying the finish.

Procedure:

1. Cut out wood stock. Use design as shown or draw up an original design.
2. Square both pieces of stock to size.
3. Locate and make the mortise in the base to receive the tenons on the upright pieces.
4. Cut upright pieces to length and make tenons. For best results, the angular cut should be made after gluing, unless a square or slightly rounded design is desired on the top of these pieces.
5. Lay out and cut chamfer on base.



Picture stand



Picture stand details

6. Cut grooves in upright pieces to receive the glass. A similar cut may be made in the base if desired.
7. Scrape and sand, in preparation for gluing and the final finish.
8. Glue and allow to dry.
9. Cut angles on upright pieces and resand.
10. Finish natural or by staining, applying at least two coats of the final finish. Rub each coat with 2/0 steel wool or finer to remove any outstanding brush marks.
11. Rub the final coat briskly with pumice and oil, wipe dry, and rub with rottenstone and oil to produce a dull, smooth finish.
12. Wax lightly and rub with dry soft cloth.
13. Cut two pieces of glass to size and sand sharp edges.
14. One or two pictures may be inserted between the glass.

INDIAN SILVERSMITHING

BEN HUNT

Tools and Equipment

The words Indian silversmithing and Navajo and Pueblo jewelry bring visions of beautiful pieces of hand-wrought silver and turquois jewelry to those who have seen this work. Rings, ear ornaments, bracelets, bow guards, necklaces, concha belts and buttons, belt buckles, and many other things are made in silver by the Indians in the southwestern part of our country. To go into the history of this art would take volumes. The history, therefore, is omitted because this series of articles is written for those who like Indian silverwork and would like to try to make some of it. To really do it right, one must be able to think like an Indian. The white man can form silver, cut turquois, and solder up the pieces, but the designs that are used by the Indians are their own. No two pieces of jewelry are exactly alike unless one thinks of a pair of ear ornaments, or a row of beads. They don't work in a production line. If you see a showcase full of Indian silver and turquois jewelry and there are a half dozen of this and a half dozen of that, identical in every way, you can be sure it isn't Indian jewelry even though the tag says it is. This production jewelry is probably assembled and soldered by Indians but the different elements and parts that go to make them up are punched out by the thousands with white man's machinery.

We do not intend these articles to show how this type of work is done, but rather to show how the work is done in the hogans and pueblos on the reservations.

Rather than start out this series with a project, let us see what is required to do the work. First of all, we'll look into a hogan of an old-time silversmith and see what tools he uses. His most important piece of equipment is his forge. This is a homemade affair of pieces of stone or broken pottery cemented together with adobe clay, equipped with a homemade bellows. Today he uses a common gasoline blowtorch which gives him the heat he wants. His anvil, most likely, is a section of rail or it may be any chunk of iron. You will also see a motley assortment of hand tools. An old claw hammer or a machinist's hammer from some automobile tool kit, a pair of cheap pliers or two, and often, instead of a tin snips, a pair of old shears. There will also be a box containing an assortment of odd shaped dies and punches made of whatever metal he could get hold of. His dies were made by forging and filing down pieces of bolts or old files or anything that comes his way. He will have a file or two, and some emery cloth, and all in all, you wonder how he can turn out anything with so few tools. But as was stated before, it is what he thinks that counts. The Indian makes shift with what he has on hand; first, because he can't stop in at a hardware store or a dime store every time he wants something,

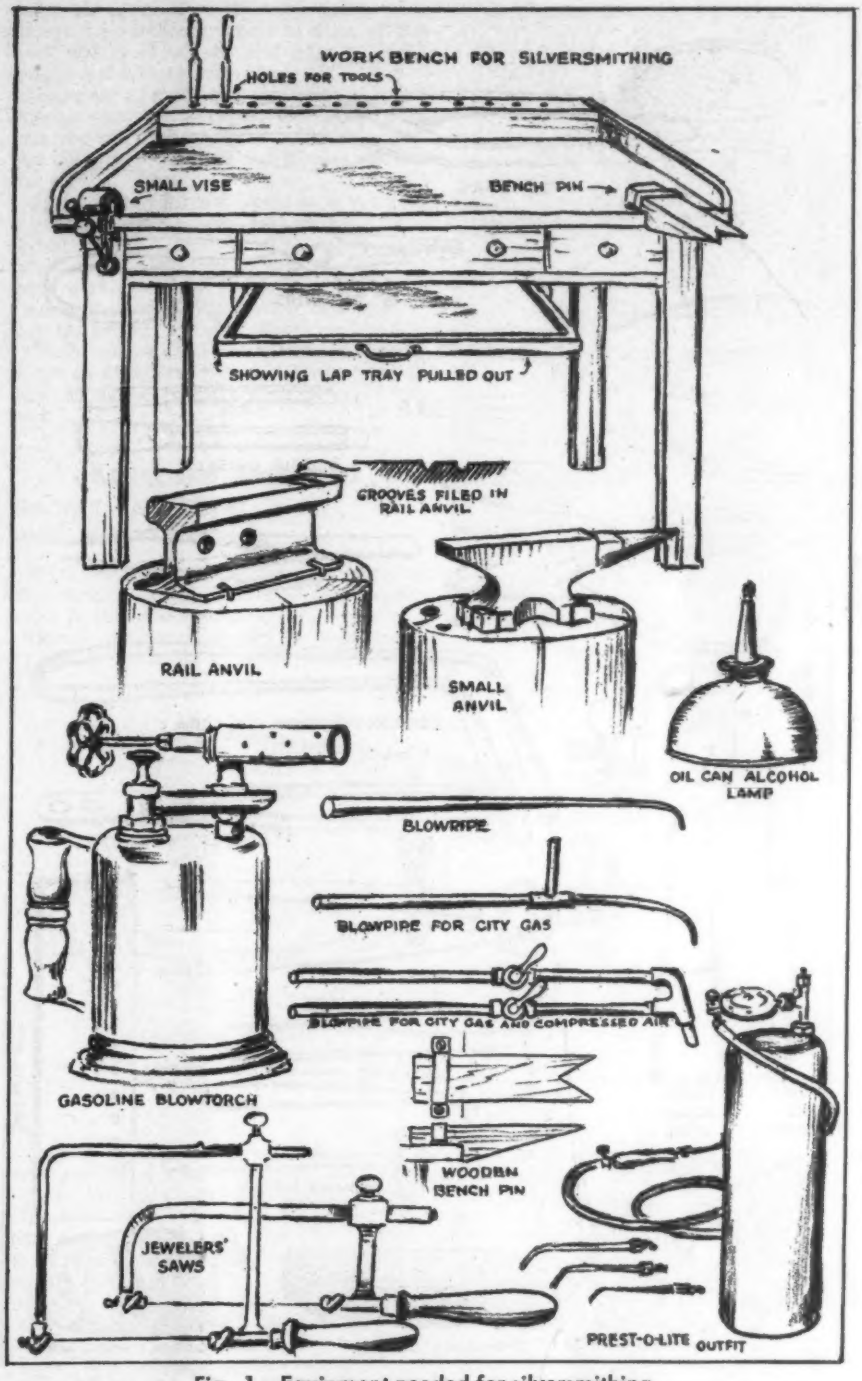


Fig. 1. Equipment needed for silversmithing

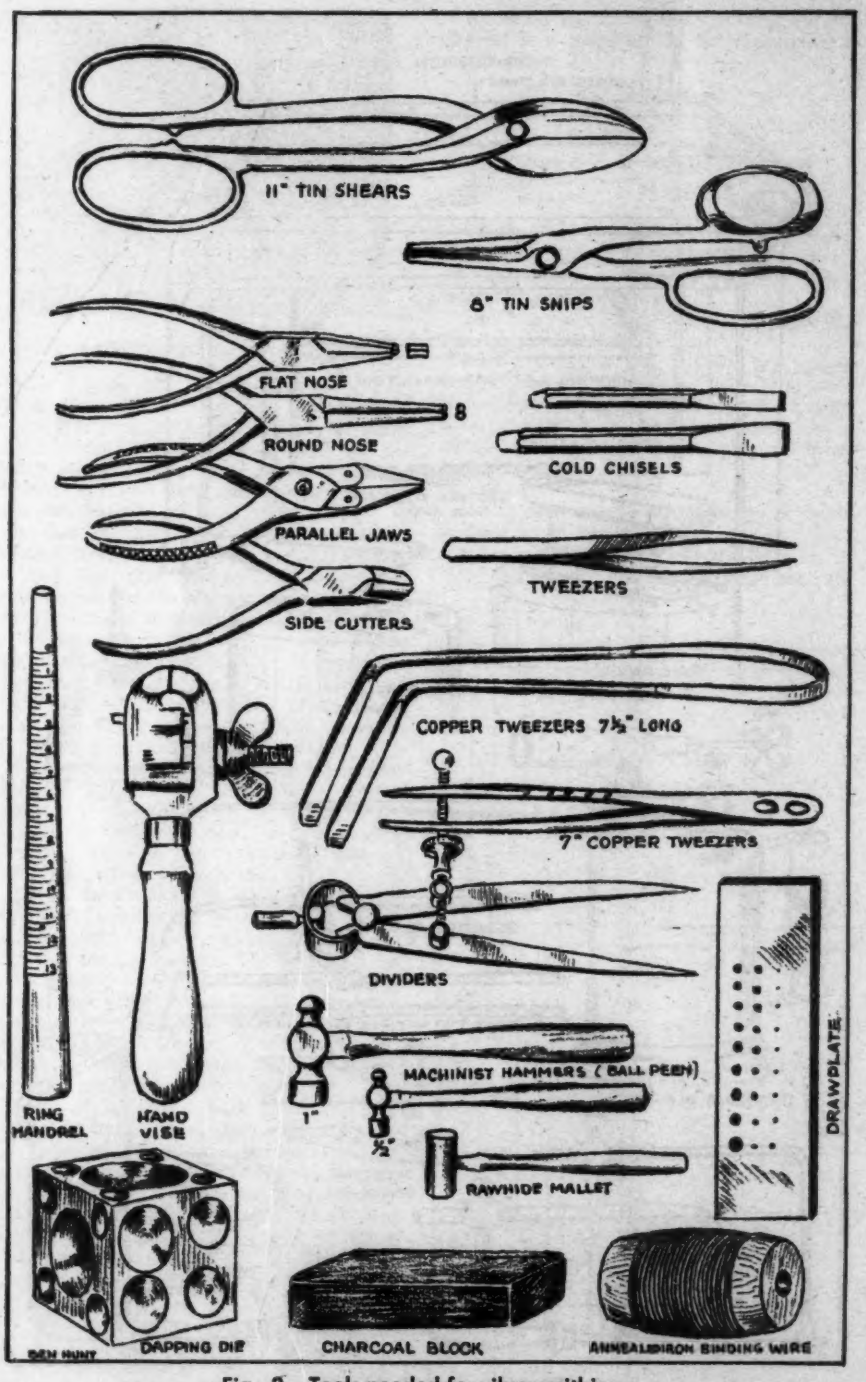


Fig. 2. Tools needed for silversmithing

and second, because he knows how to work with simple tools. As to ideas, he has many tucked away in his mind. That is an Indian trait — the storing up of ideas. The Navajo woman for instance, has all the designs for her elaborate rugs tucked away in her mind.

The Indian silversmith, as a rule, figures out his designs according to the piece of turquois he has on hand and the amount of silver he has. The up-to-date Indian has all the tools that we have but it must be remembered that the Navajo is a nomad who moves from one place to another to find pasturage for his sheep and horses. Therefore, he cannot burden himself with a lot of equipment which he can very well get along without. He can and will use any modern equipment he can procure, and nothing pleases these craftsmen so much as a wire drawplate or some good files or pliers.

But the beginner should remember that it is not necessary to buy a lot of expensive equipment to start with. Some things are rather essential but it is the author's experience that getting and making equipment and tools as one needs them is more gratifying than just buying a lot of things that will probably never be used. Remember that tools alone will not produce well-balanced and well-designed pieces of jewelry.

The first thing to do is to find a good spot for your workshop or work space. This space should be such that unfinished work can be left as is until it can be taken up again. There also will be quite an assortment of small tools after a while, and you will not want everyone to handle them. It would be good policy to have some sort of cabinet in which these tools can be kept, and you will also want some sort of cabinet with drawers to keep silver, silver solder, and stones. As there is no set rule for the space you use, it will be up to the individual to provide it as he or she sees fit.

A solid table or bench is necessary and a small 3 or 4-in. vise should be fastened to one side of it. In jewelry shops and even in the Indian schools where silversmithing is taught, have a sliding tray below the table, that can be pulled out over the worker's lap to catch chips and silver filings. These scraps and filings accumulate to a surprising degree over a period of time. They should be put into a tin or wooden box until such a time when you may want to do some casting, or you may want to have the scrap melted and rolled into sheets again. This tray need only be an inch deep, and it should have a tin or stainless steel bottom.

It is well to cover the entire top of the table with a sheet of metal, because then it is easily cleaned and because you won't burn any holes in it when you are soldering.

There should also be a shelf or a space on the wall for tools. A well-shaded 100-watt lamp should be above the workbench also.

You will need some sort of anvil. This can be a regular small anvil or a piece of rail. If it consists of a piece of rail, be sure it is not worn down as they sometimes are. This wear is usually one-sided and on a slant. Get a new piece, if possible, preferably a foot long. The anvil, no matter what kind it is, should be mounted on a large block or log, and at a height that will enable you to use it while seated. If you can, get a section of a log at least 12 in. in diameter. The space not covered by the anvil will come in handy when you are shaping silver. Depressions can be cut or hammered into the log when needed, and a large log will also stand more solidly than a small one.

The gasoline torch solves most of the heating problems. These torches are not expensive and are easy to handle and transport.

Fuel or illuminating gas also will answer very well. The small blowpipe shown in Figure 1 will answer very well. The use of these blowpipes will be shown and described later on.

For very small work an alcohol lamp and blowpipe is sometimes used, but this method of heating is not recommended for general work, nor are the small automatic blowtorches.

The ideal layout recommended for soldering, melting, and annealing silver is the small portable gas tank equipped with hose and different size nozzles. Your heating problem sums up to this. Illuminating or fuel gas, if you have it in your home, is the simplest form of heating. Portable gas such as Prestolite is second. It can really be called the ideal heating unit, since it is portable and does not require a blowpipe which is sometimes a nuisance. It also provides enough heat for melting silver in crucible for casting, and can

be used with a small nozzle or burner for very small work. Fuel or natural gas, if used with a double blowpipe and a small air compresser, can also be used for smelting. The drawback with a gasoline blowtorch is that it takes a while to light it and unless the tiny openings are carbon free, it cannot be turned down to a low flame while not in use. Gas, on the other hand, can be shut off and on in a jiffy.

Last in line is the small alcohol lamp and blowpipe for very small work.

You will need a couple of hammers at least but you will no doubt have those already. If you do not, choose a medium size, ball-peen machinist's hammer with a 1-in. flat face to start with. Later you may want a smaller hammer and probably a larger one also for heavy work. But ball-peen hammers are ideal for Indian jewelry, the ball coming in handy for a lot of things.

For cutting silver there are four tools that you can and will use; the cold chisel, tin shears, jeweler's saw, and the cutting pliers. The cold chisel is probably the simplest, but while you will use it at times, it's drawback is that it cuts up the face of the anvil when it is used. However, several small chisels should be in your tool rack.

A good tin shears is a must. In fact, we would suggest you have a large one and a small one. The jeweler's saw comes in mighty handy at all times. Get one with an adjustable frame if possible, and it should be about 6 in. deep. An assortment of blades should be on hand, ranging from No. 2/0 to 1½ or 2. For use with the saw you should have a bench pin. This is fastened to the bench over the tray and is used for both sawing and filing.

There are a great many types of pliers that can be used for silversmithing. A flat nosed plier for flatwork and a round nose plier for wire will be found helpful. For cutting wire a parallel jaw or side cutting pliers is to be recommended as it is bad policy to cut wire with the tin shears.

Then you should have some tweezers for handling the small snippets of solder and for assembling small work. It may be well to make the two shown in the illustration. The ones shown are made of heavy copper wire and are very efficient. A small hand vise is also a handy tool to have around.

Now we come to the question of files. You will, before you are at this work very long, have quite an assortment of them. Files for jewelry work should be rather fine cut. A good flat file, a half round and a round file are enough to start with. When you get to making the more elaborate pieces you will, no doubt, have a set of needle files on your shelf also.

For shaping rings a ring mandrel is very necessary. It is a long tapered piece of round steel with ring sizes marked on it.

A small hand drill also should be provided.

For making hollow beads and hammering up half spheres a dapping die will be helpful, but the old-time Indians made them of hardwood and used a metal punch.

A rawhide hammer is also a good thing to have around but a small wooden mallet will do equally as well. A motor-driven grinding wheel with a felt or muslin polishing wheel on one side is very handy, but it can be omitted if you don't have one, as silver can be polished by hand with powdered pumice stone, and crocus cloth.

The Indian and most white silversmiths make all or most of their die stamps. Die stamps are rather important in some of this work and more will be said later on about designs and how to make them.

There are a lot of small tools such as center punches, scribers, dividers, and other tools that you will probably have on hand, or that you will pick up from time to time as you feel the need of them.

A couple of charcoal blocks or a piece of asbestos will be needed for soldering. You should have a pickle jar. This can be any stone jar. A 1-gal. size is large enough for most work. A pyrex frying pan, heated on a gas burner or a small electric heating unit, may be used for cleaning silver.

There will be other small items mentioned as we go along, but some of these essential items should be on hand when beginning this work.

DARKROOM SAFELIGHT

SIMON S. PALESTRANT
Bronx, New York City

A very efficient safelight can be constructed very cheaply out of odds and ends usually found in the school shop.

Here is the procedure and the accompanying sketch will indicate the sizes. Locate two cover lids of coffee cans, 1-lb. size. These covers are about 5 in. in diameter, and have a ¼-in. lip along their perimeters. With a pair of tin snips, cut across the circle 1 in. from the center of both lids. Cut a circle out of one as shown in the diagram so that a socket will fit into it snugly. Solder the socket into place. Make sure the socket switch, preferably a pull-chain type, is on the outside of the lid.

Now cut a rectangular piece of sheet iron (any metal will do) to fit the leftover perimeter of the lid (11½ in.) and 7 in. wide. Solder the lids to the long dimension of the piece of sheet iron. Be sure that the electric socket faces inward.

Then cut down the length of the curtain rod as shown in the diagram. Solder the short end around the cutoff edges of the newly soldered semicylindrical reflector so that it forms a nicely finished edge. The other part of the curtain rod is laid off into four continuous parts coinciding with the lengths of the edges of the reflector. Cut 90-deg. angle V-notches at the points shown. Bend it around a piece of ruby glass (or wratten No. 2 filter) and solder the points. A light touch of the solder iron is sufficient to make the joint.

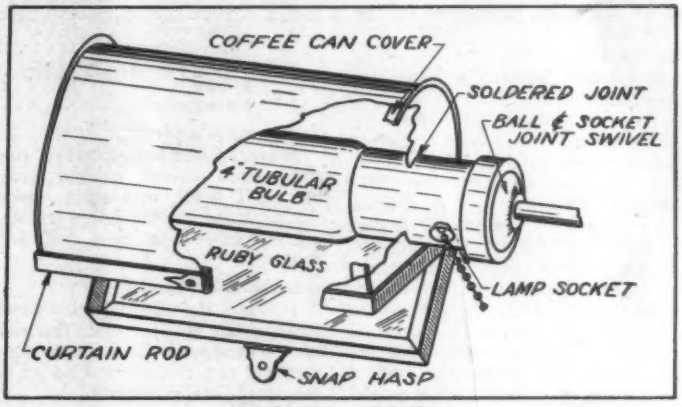
A continuous piano hinge 7 in. long, or two cigar box hinges, may be soldered so that the cover will fit correctly over the opening. On the opposite side solder the snap hasp, one part to the cover, the other to the reflector. Be sure that it pulls the cover down tightly so that there are no light leaks.

If a light leak should occur then cut out a gasket of felt, cork, or sheet rubber whichever is available, and cement it to the underside of the cover so that it overlaps the edges of the reflector.

Add an electric ball-and-socket swivel joint to the socket for freedom of angular movement and attach it all to an old telephone extension arm to allow movement about as wide an arc as is necessary. If this extension arm is not available, then add a T joint to the ball-and-socket joint and a flange plate to the angled arm of the T joint. Screw the plate down to anchor the safelight and wire the entire setup with a 5-ft. extension cord and a male electric plug.

Paint the outside with black paint or

Darkroom safelight



Darkroom safelight

enamel, but first wash the metal with a rag soaked in vinegar so that the paint will adhere better. Apply the paint after the vinegar is dry. A 4-in. tubular bulb finishes the job.

BILL OF MATERIALS

2 coffee can lids
1 piece of 7 by 11½-in. sheet metal
1 section of a flat curtain rod
1 snap catch
2 cigar box hinges or
1 6-in. length of piano hinge
1 pull-chain electric socket
1 4-in. tubular bulb
1 electric ball-and-socket swivel joint
1 telephone extension arm or
1 electric T joint and
1 flange anchor plate to fit the T joint
1 piece of 4 by 7-in. ruby glass or
1 4 by 7 wratten filter No. 2
½ pint of black paint
5 ft. of electric extension cord
1 electric plug

FOOTSTOOL

LYLE M. GARNETT
Milwaukee Vocational School
Milwaukee, Wis.

Purpose:

1. To make a footrest.
2. To use clamp nails to hold the mitered corners together.
3. To cut the compound miter joint for the corners of the stool.

Technical Information:

The frame for this footrest is joined together with a miter joint at each of the four corners. To be able to hold the corners together securely without either nails or screws showing at the corners requires some kind of a joint that will hide the fasteners. This might be done by the use of a very difficult spline joint. Such a joint requires the sawing of a slot in each half of the miter joint and inserting a thin piece of wood in the slots. There would be considerable trouble in clamping the pieces together while the glue would be drying and it might require the gluing of small blocks on the outside surfaces of the frame so as to hold the clamps. The method requires a great deal more labor than is needed

Footstool

when a small metal device known as a clamp nail is used. This nail is a flat piece of metal, shaped like a wedge, with two ridges on each edge. To use this nail in holding a joint together, a thin saw kerf is made in each half of the miter. The two halves are then placed together so the saw kerfs will line up and the clamp nail is inserted into the slots with the widest end being driven first. This action is simply the opposite of a wedge and draws the pieces together instead of separating them.

BILL OF MATERIAL

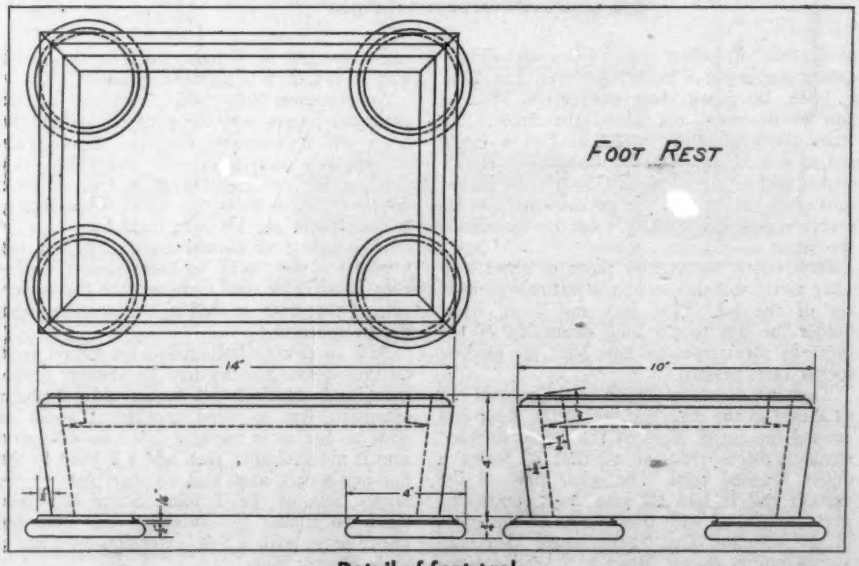
No. of pieces	*Name of part*	*Size*
2	Ends	¾ x ? x 11
2	Sides	¾ x ? x 15
4	Feet	¾ x ? x ?
8	Clamp nails	¾ x 1
2	Cleats — birch	¾ x 1 x 11
2	Cleats — birch	¾ x 1 x 14
12	Screws	No. 8 x 1¼ f.h.
8	Screws	No. 8 x 1½ f.h.

Tools and Machines:

Jointer, miter box, hammer, rule, countersink, screw driver, circular saw, backsaw, planer, T bevel, drill stock, marking gauge, shaper, wood turning lathe, try square, framing square, 3/16-in. twist drill, 3/32-in. twist drill.

Construction Procedure:

1. Select the material from which you wish to construct the footstool. This should be one of the hardwoods that will take a good finish and will last under the kind of treatment a footstool usually receives.



Detail of footstool

2. Complete the stock bill where the information was not completely given. Use the finished dimensions as given in the drawing.
3. Cut the stock of the type selected for the footstool to rough dimensions. This means that the pieces should be cut about ⅛ in. wider and about ½ in. longer than called for in the stock bill. For the feet cut one board long enough to make the four pieces with about ½ in. to spare.
4. Face one face of each board on the jointer if the stock is rough; otherwise, select pieces that are true or with no evidence of warp in them.
5. Plane this stock to a thickness of three fourths of an inch. This should be done on the planer if the stock is rough; otherwise, use it as it comes from the board.
6. Set a T bevel for the outward slant of the sides of the frame of the stool. This angle is not given in degrees but may be obtained by setting the T bevel on the framing square so that the blade of the T bevel will cross the ½-in. mark on the blade, and the 4-in. mark on the tongue of the framing square.
7. Set the fence of the jointer to this angle.
8. Lower the front or infeed table of the jointer enough so that the machine will take a cut deep enough to bevel the edge of the board with one single cut.
9. Make a cut on one edge of each of the side boards of the stool and on one edge of each of the cleats.
10. Adjust the ripping fence of the circular saw 4 1/16 in. from the saw blade and rip the four pieces for the frame of the stool. Be very sure that the beveled edge of the pieces is held against the ripping fence while the sawing is done.
11. Make a second beveled cut on the rough edge of these pieces. This cut should be made on the jointer also using the same identical setup as for the first edge. Be very careful that this second bevel cut is parallel to the first bevel cut.
12. Set the shaper to make a corner bead cut with a fillet as shown on the drawing.
13. Make this cut on the outer arris of the upper beveled edge on each of the four pieces that make up the frame.
14. To make the miter cuts on the corners make a jig for the miter box. This jig may consist of a single piece of stock ¼ in. thick and ½ in. wide nailed to the bottom board of the miter box so that one edge of the strip will be against the fence of the miter box.
15. Place one face of the sidepiece for the frame against the front edge of the strip and rest the top edge of the sidepiece against the fence of the miter box frame and then saw off one end of the board at an angle of 45 deg.
16. Repeat this same operation on each of the four pieces for the frame but be sure that only one end is mitered at this time.
17. Adjust the length gauge stop of the miter box so you will be cutting a length of 14 in. at the longest point on the side boards, and a length of 10 in. on the longest point of the end boards; then miter the second end of each board.
18. Set a marking gauge so the point will be 13 in. from the head of the gauge.
19. Draw a gauge line on the mitered surfaces holding the head of the marking gauge against the pointed end of the miter.
20. Place the piece of stock in a vise so the mitered surface is parallel with the floor

and with a backsaw held along the gauge line make a saw cut ⅛ in. deep. Be sure the cut is at right angles to the mitered surfaces. A dovetail saw is better than a backsaw for making this cut since the blade of the dovetail saw is thinner than the backsaw.

21. Repeat this operation on each end of each of the four pieces of the frame.

22. Sandpaper the outer surfaces of the boards using at least two different grades of sandpaper to complete the job.

23. Hold the mitered ends of one sidepiece and one of the endpieces together so the saw kerfs line up and place the widest end of the clamp nail in the saw kerfs, then drive the clamp nail into place in the same way any other nail would be driven home. If this operation is properly performed the joint will spread apart.

24. Use two clamp nails on each mitered joint driving a nail from each edge of the boards.

25. Nail each of the four corners together in this manner.

26. Drill three holes in each of the cleats for the screws. These holes should be 3/16 in. in diameter and are to be countersunk for the 1¼-in. wood screws.

27. Glue and screw the short cleats to the ends of the frame. The beveled edge of the cleat is placed on the top edge of the frame and in such a position as to be flush with the top edges. Repeat the same operation with the longer cleats on the side of the frame.

28. Draw four circles on the piece of stock to be used for the feet. Each of these circles should be 4 1/16 in. in diameter.

29. Band-saw the four pieces, sawing just outside the line or in other words, leave a bit of waste stock on the disk.

30. Drill a 3/16-in. hole in the center of each of the four pieces. This hole is for the screw of the rosette chuck.

31. Mount a rosette chuck on the wood lathe, screw one of the blanks in place and turn the blank to a diameter of 4 in. Caliper this blank so you will know when the 4-in. diameter is reached.

32. Turn the pattern on the edge of the blank as indicated on the drawing; then sandpaper the foot very smoothly before removing it from the chuck.

33. Repeat this same operation on each of the four feet.

34. Place one of the feet on the bottom of the frame so the corner of the frame just touches the edge of the cove on the top of the foot. Space off the sides so both margins are the same and with a very sharp pencil draw a very light line on the top surface of the foot.

35. Remove the foot from the frame and space off two points for the screws that will hold the foot to the frame. These holes should be at least ⅜ in. from the outside edge of the frame.

36. Bore a 3/16-in. hole at each of these points and countersink the hole on the bottom surface of the foot.

37. Screw the feet in place with the flat-head screws.

38. Sandpaper the entire stool with a very fine grade of sandpaper prior to the final finishing.

39. Put a finish on the footstool that harmonizes with the type of material used in making the frame.

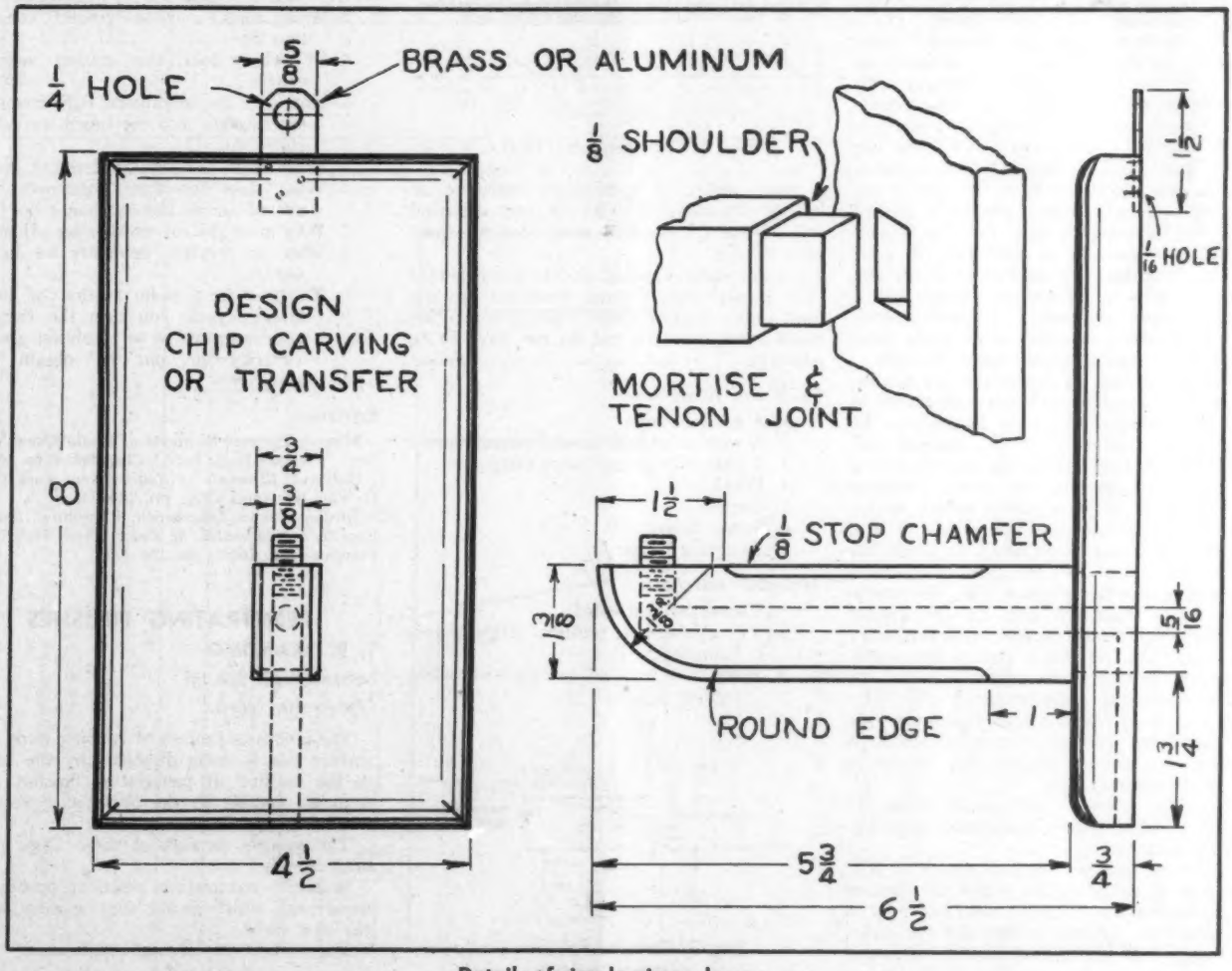
40. Upholster the top of the seat after the finishing process is completed. Use any suitable covering for the stool.

SIMPLE PIN-UP LAMP

HARRY S. BALDWIN
General Mercer School
Toronto, Ont., Can.

Procedure:

1. True up the back to ¾ by 4½ by 8 in.
2. True up the arm to ¾ by 1⅜ by 6½ in.
3. Lay out and make the mortise-and-tenon joint. See detail sketch.
4. Round the edges on the back.



Details of simple pin-up lamp

5. Lay out the stop chamfer on the arm and remove wood with firmer chisel and file.
6. Round the bottom side of arm with chisel and a strip of sandpaper.
7. Bore a ⅜-in. vertical hole in the arm about ¾ in. deep.
8. Bore a 5/16-in. hole the long way into the arm.
9. Sandpaper the whole project except the mortise-and-tenon joint.
10. If desired, design the back part of lamp with chip carving.
11. Glue the joint and clamp in the vise for one hour.
12. Finish as desired, with paint, stain, or oiled finish.

CRYSTAL DETECTOR RECEIVER

WILLIAM R. STOCKING, JR.
Detroit, Mich.

Objectives:

1. To wire up a crystal detector receiver.
2. To learn how to adjust and tune the receiver.
3. To learn how a crystal detector works.

Radio Theory:

A crystal detector receiver has the same four sections that all radio receivers have: (1) a receiving antenna to pick up modulated radio frequencies from several stations, (2) a station selector to select the modulated radio frequency of one station, (3) a detector to change the modulated radio frequency into audio-frequency electricity, and (4) a reproducer (earphones) to change the audio-frequency electricity into sound waves. There are no amplifier tubes in the receiver and, therefore, the only electricity in the receiver is the modulated radio-frequency electricity picked up by the receiving antenna. For this reason, the antenna must be a good one. A good antenna improves the performance of *any* radio, in spite of advertising claims that a receiver "needs no aerial." A good ground, such as a wire connected to a water pipe, makes the receiving antenna more effective.

The station selector consists of a coil connected to a variable condenser and placed in close relationship (inductively coupled) to the primary coil connected to the antenna and ground. Modulated radio-frequency electricity flowing in the primary coil makes changing magnetic lines of force which induce modulated radio electricity into the tuned coil. The variable condenser is adjusted to make the tuned coil "pick up" the modulated radio frequencies of other stations. This one modulated radio frequency goes to the crystal detector which changes it into audio-frequency electricity. The earphones change the audio-frequency electricity into sound.

The modulated radio-frequency electricity from the tuned coil is a high frequency type of alternating current electricity which is alternately becoming stronger and weaker at an audio-frequency rate.

Carefully examine the graph shown in Figure 1, which shows modulated radio-frequency electricity.

Above the line are the half cycles of R.F. that flow in one direction. Below the line are the radio-frequency half cycles that flow in one direction. Below the line are the radio-frequency half cycles that flow in the other direction. It can be seen that if the radio-

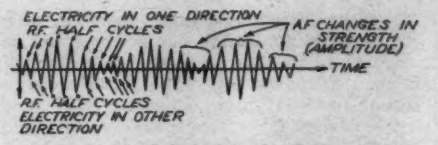


Fig. 1. Modulated radio-frequency electricity

frequency half cycles in one direction were eliminated, the half cycles in the other direction could be *averaged up* into an audio-frequency changing direct current.

Certain substances such as galena and carborundum have spots on their surface which will allow electricity to pass through in one direction only. These substances are used as detectors to allow radio-frequency half cycles in one direction only to go from the tuned coil through the earphones. The fixed condenser connected across the earphone terminals *averages up* the radio frequency half cycles into an audio frequency changing direct current which the earphones convert into sound.

A crystal detector consists of a mounted crystal and a wire called a *cat whisker*. The end of the cat whisker must be adjusted so that it will rest on a spot on the crystal's surface which is especially *sensitive* — that is,

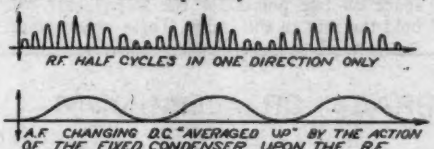

R.F. HALF CYCLES IN ONE DIRECTION ONLY
A.F. CHANGING D.C. "AVERAGED UP" BY THE ACTION OF THE FIXED CONDENSER UPON THE R.F. HALF CYCLES SHOWN ABOVE.

Fig. 2. Changing a.f. to d.c.

a spot which is particularly effective in letting electricity through in one direction only. There are usually several sensitive spots on a crystal.

In the early days of radio, many people built crystal sets. Crystal detectors are not used today because radio tube detectors are much more sensitive and do not have to be adjusted.

Tools and Equipment:

1. A good antenna
2. A wire to a good ground connection
3. A pair of high resistance earphones
4. Pliers
5. Cutters
6. Screw driver
7. Soldering copper

Materials and Parts:

1. Chassis or baseboard
2. Two double post terminal strips or four Fahnestock clips
3. Bolts and nuts or screws with which to mount parts
4. R.F. coil with primary and secondary windings
5. Variable condenser — 350 to 400 mmf.
6. Fixed condenser — .00025 or .0001 mfd.
7. Crystal detector
8. Hookup wire
9. Rosin core solder

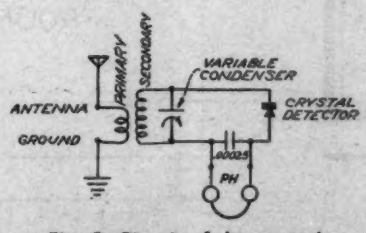


Fig. 3. Circuit of the crystal detector receiver

Procedure:

1. Make a sketch showing the placement of parts on the chassis or baseboard.
2. Draw lines showing where the wires should be placed. (Use the schematic circuit to find these.)
3. Have the sketch checked and approved.
4. Mount the parts (omit these steps if this part of the job is done).
5. Connect antenna, ground, and earphones.
6. Wire the receiver.
7. Adjust the cat whisker and variable condenser at the same time, until a station is heard.
8. Adjust the variable condenser alone until the station is loudest.
9. Readjust the cat whisker to find the most sensitive spot on the crystal.
10. Adjust the variable condenser to observe how many stations can be received.

Questions:

1. Why should the receiving antenna used with a crystal set be a good one?
2. What does a good ground connection do?
3. Of what does the station selector consist?
4. How does the modulated R.F. from the antenna get into the tuned secondary coil?
5. What does the crystal detector do?
6. What does the fixed condenser connected across the earphones do?
7. Why must the cat whisker be adjusted?
8. Why are crystal detectors no longer used?
9. To tune in a radio station of lower frequency do you turn the variable condenser plates *in* to obtain greater capacity or *out* to obtain less capacity?

References:

Marcus, Horton, *Elements of Radio* (New York City: Prentice-Hall, Inc.), Chapters 4 to 10.

Hellman, *Elements of Radio* (New York City: D. Van Nostrand Co.), pp. 244–246.

Jordan Nelson, Osterbroch, Pumphrey, Smeby, Everitt, *Fundamentals of Radio* (New York City: Prentice-Hall, Inc.), pp. 276–277.

PENETRATING FINISHES

T. R. BRANDMO
Senior High School
Cheyenne, Wyo.

The laborious process of rubbing wood with surface oils is being displaced by the return to the method of penetrating finishes. This is made possible by the *Sealacell Process* of wood finishing.

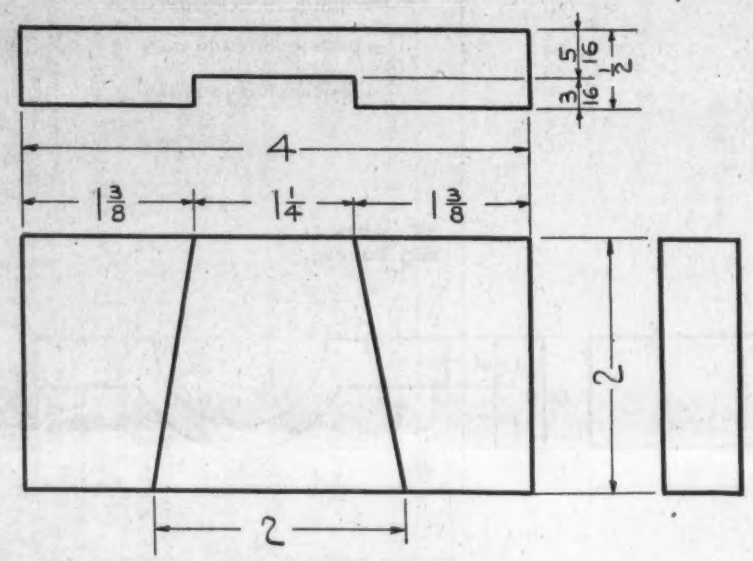
The process consists of three allied products, namely:

Sealacell, a moisture repellent penetrating wood seal, which is the first application on the new wood.

Varnowax, the second application, is a

(*Continued on page 37*)

Job 11. Complete the views by drawing in the missing lines. Answer the questions.
Purpose: To teach the use of visible and invisible lines.

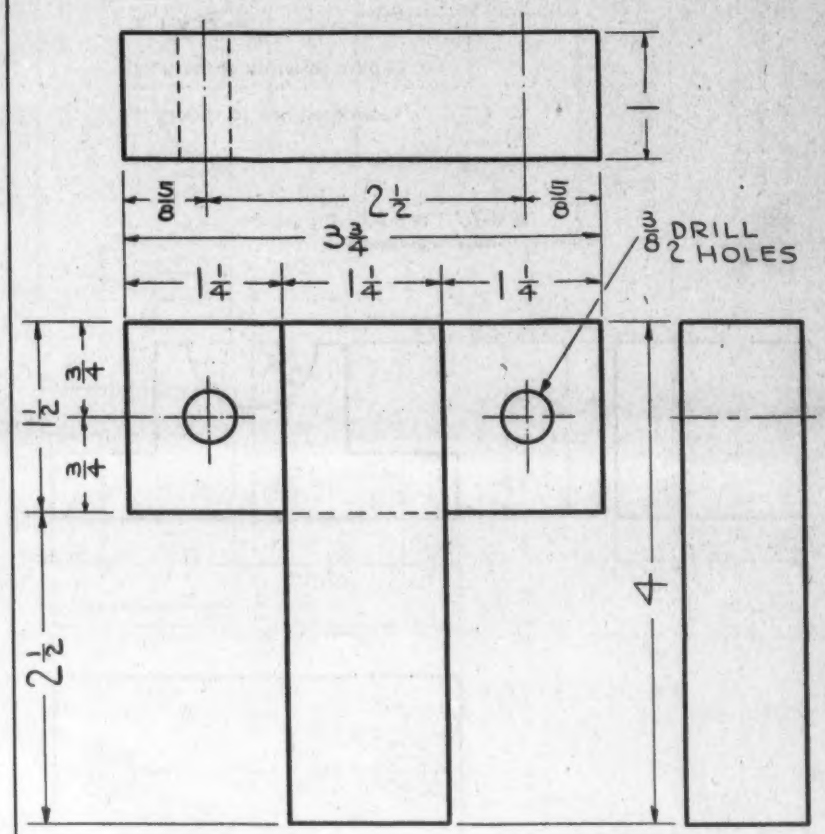


Dovetail Joint

1. Depth of dovetail =
2. Widths of dovetail =
3. Length of dovetail =

Your Name Date Completed

Job 12. Complete the views by drawing in the missing lines. Answer the questions.
Purpose: To teach the use of visible and invisible object lines.



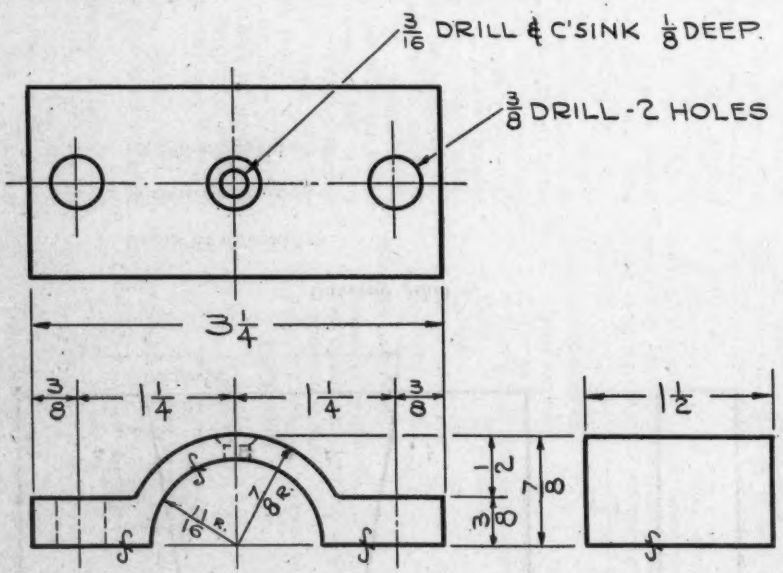
1. Width of stock =
2. Depth of joint =
3. Thickness of stock =
4. C. to C. of drilled holes =

End half-Lap Joint

Your Name Date Completed

Job 13. Complete the views by drawing in the missing lines. Answer the questions.

Purpose: To teach the use of visible and invisible object lines.



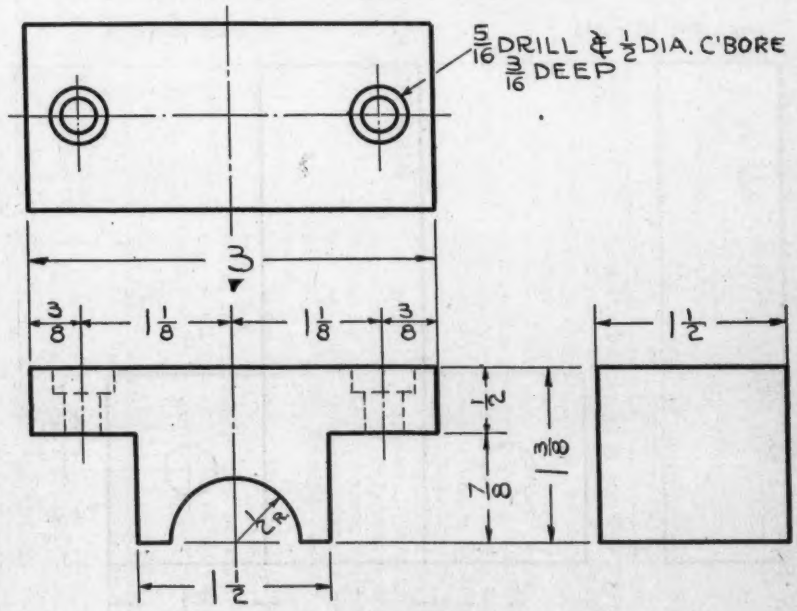
Bearing Cap
2 Req'd — Bz.

1. f =
2. Depth of countersink =
3. Kind of material used =
4. Depth of ⅜-in. drill holes =

Your Name | Date Completed

Job 14. Complete the views by drawing in the missing lines. Answer the questions.

Purpose: To teach the use of visible and invisible object lines.



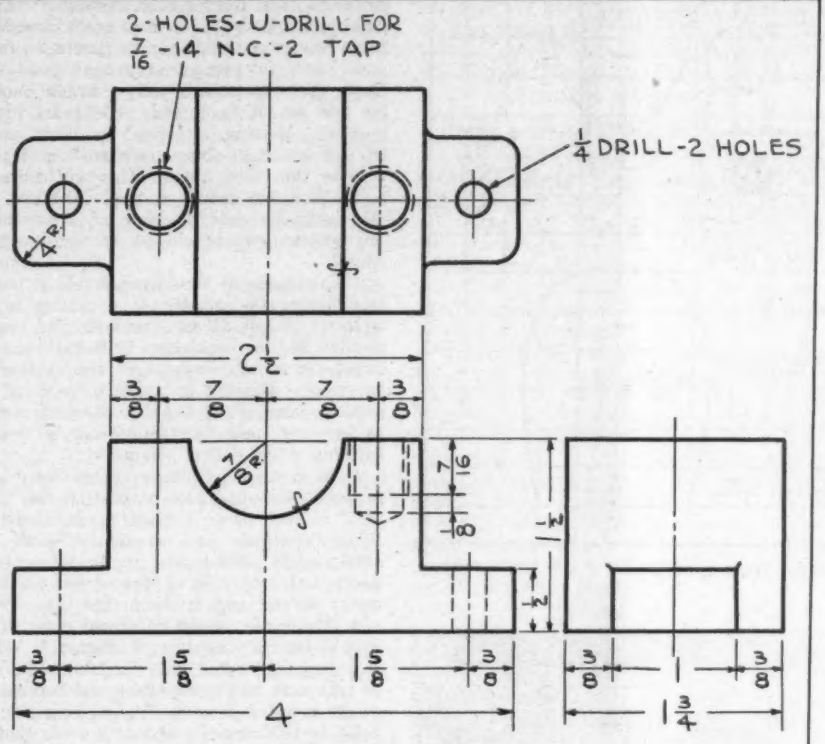
Lower Bearing
1 Req'd — M.I. — F.A.O.

1. Depth of counterbore =
2. Kind of material used =
3. F.A.O. =

Your Name | Date Completed

Job 15. Complete the views by drawing in the missing lines. Answer the questions.

Purpose: To show the use of visible and invisible object lines.



Shaft Bearing — Lower
1 Req'd. — C.I.

1. Depth of tapped hole =
2. Drill depth =
3. Dia. of shaft bore =

Your Name Date Completed

Fundamentals of blueprint reading. C. H. Niemann, Hammond, Ind.

PENETRATING FINISHES

(*Continued from page 34*)

quick drying, semipenetrating blend of waxes and gums to be applied over surfaces treated with Sealacell.

G. F. Finish, the third and final coat, used over Varnowax, is a special blend of varnish, gums, and wax which partly penetrates the wood to give a rich finish of satin luster.

In addition to securing a beautiful and durable finish, the process affords the following advantages:

1. Sanding is done on the raw wood *only*.
2. No rubbing is required between coats.
3. Sealacell does not raise the grain of wood.
4. No special finishing room is required.
5. All materials are dustproof immediately after application.
6. No brushes are required. (Oils are applied with a cloth.)
7. Lap marks are eliminated.
8. Ninety-five per cent of the finish penetrates the wood.
9. It is highly resistant to alcoholic beverages, cosmetics, hot dishes, etc.
10. It will not check, crack, or craze.
11. The finish is patchable.

Instructors in school shops should find these finishes highly satisfactory and most economical to use for project finishing. The writer has used the process for the past two years with excellent results. It is an ideal finishing material for young craftsmen who find shellac, varnish, and lacquer difficult to handle successfully.

For finishing work on the wood lathe, it is far superior to the present *French polishing* as it requires no special skill on the boys' part.

Aside from the application of the oils for a *natural* finish, other procedures are also possible.*

Filling: If filling is desired, cut the paste filler with the Sealacell in place of turpentine or mineral spirits, and fill in the usual manner. Fill and seal in one operation.

Staining: A Sealacell stain is made by using ground-in-oil colors well mixed into Sealacell, using sufficient pigment to produce the desired shade. If you wish, staining may be done first with any commercial oil stain and allowed to dry. Then proceed with the three oils.

To Fill, Stain, and Seal in One Operation: Cut the natural paste filler with Sealacell and add enough ground-in-oil pigment to secure the proper color and proceed in the same manner as in customary filling.

Patching: Cigarette burns may be buffed out with No. 2/0 steel wool. Apply G. F. Finish, overlapping the edges. When thoroughly dry, buff the repaired spot with 2/0 steel wool to blend the finish. Any damaged spot may be removed in the same manner.

The Sealacell process of wood finishing has also been used in our adult furniture refinishing classes and has made possible in days a finish which formerly required weeks of rubbing by the linseed oil method.

*A process perfected by General Finishes Sales and Service Co., 1548 West Bruce St., Milwaukee 4, Wis.

CAST BRONZE BOOK ENDS

STEPHEN RANDEL
Industrial-Arts Department
East Mississippi Junior College
Scooba, Miss.

A rather unique project which involves patternmaking, foundry practice, plastics, and general metalwork is the simple pair of book ends shown herewith. Enough weight is included to make them practical for holding up any number of books without the usual amount of balancing and adjusting that occurs with the average set of book ends. The figure of the boy is made of solid bronze and fastened to a plastic, plexiglas base. Brass machine screws fix the figure to the base and upright piece.

Making a Wood Pattern

Before the figure can be poured in bronze, a wood pattern is first made. Figure 1 shows details of the pattern. It is made of 2-in. red mahogany.

1. The side view of the design is transferred on the wood and band-sawed within 1/32 in. of the line.

2. After sawing from one side, the pattern is placed on its back and dimensions from the center line are transferred with a pair of dividers so that the pattern will be symmetrical. Transfer enough points so that a neat, uniform outline can be made.

3. Hold the pattern in this same position and band-saw to within 1/32 in. of the line for the second cut.

4. With a pocketknife, whittle the body of the figure to the desired shape.

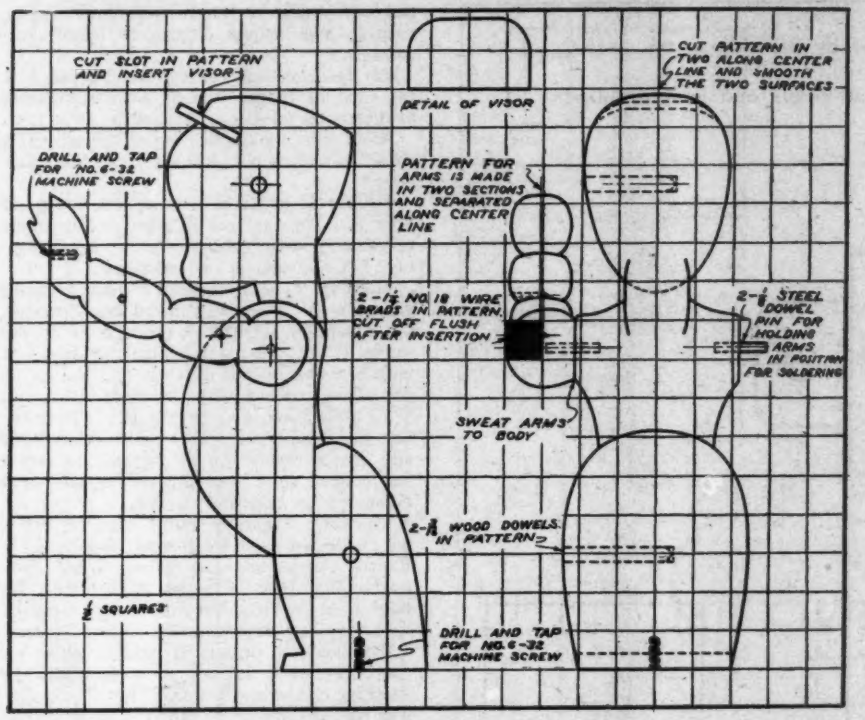

CUT SLOT IN PATTERN AND INSERT VISOR
DETAIL OF VISOR
CUT PATTERN IN TWO ALONG CENTER LINE AND SMOOTH THE TWO SURFACES
DRILL AND TAP FOR NO. 6-32 MACHINE SCREW
PATTERN FOR ARMS IS MADE IN TWO SECTIONS AND SEPARATED ALONG CENTER LINE
2-1½ NO. 18 WIRE BRADS IN PATTERN. CUT OFF FLUSH AFTER INSERTION
2-⅛ STEEL DOWEL PIN FOR HOLDING ARMS IN POSITION FOR SOLDERING
SWEAT ARMS TO BODY
2-⅜ WOOD DOWELS IN PATTERN
½ SQUARES
DRILL AND TAP FOR NO. 6-32 MACHINE SCREW

Fig. 1. Details of pattern for casting of boy

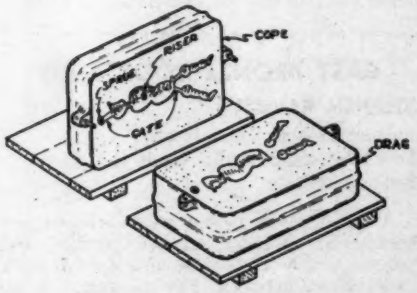


Fig. 2. Arrangement for castings in sand mold, showing mold cavity, sprue and riser locations

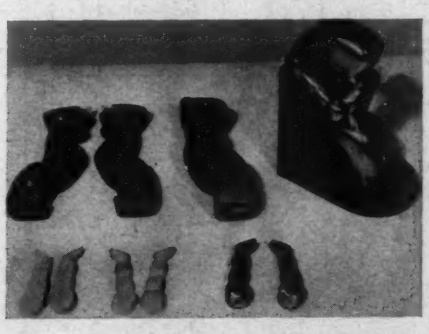


Fig. 3. Arm and body patterns, rough castings, and finished book end

5. Place the figure in a wood vise and with a backsaw cut it in two along the center line.

6. Smooth the cut surface by placing it down on a flat piece of No. 1 abrasive paper and sand smooth.

7. Place the two halves together and drill two 3/16-in. dia. holes through one half of the figure, and about ⅜ in. into the other half.

8. Insert a 3/16-in. dowel through one half and let it extend about ¼ in. into the other half of the figure. If a tight fit is made on the dowel rod it will not be necessary to glue this into the figure.

9. Taper the end which extends into the other half. The two halves should separate with very little effort.

10. Cut the outside end of the dowel off flush with the body of the figure.

11. Make the visor and insert it. No glue will be necessary if a tight fit is made.

12. The arms of the figure can all be made from one fabricated block. Select two pieces of mahogany ½ by 1½ by 8 in.

13. Place these two pieces together so that they form a block 1 by 1½ by 8 in.

14. Fasten them together with a wire brad or a small screw at each end.

15. Lay out the arms and whittle to shape. When the arms are whittled out they will be in two sections.

16. Drive two wire brads through half of each arm and let them extend about 1/16 in. into the other half. To prevent splitting, the brads can be *drilled* in by placing them in a small hand drill and using them as a regular drill.

17. When they are drilled into the wood, release the chuck and remove the drill. The two halves should separate with very little or no effort at all. If all parts of the pattern do not separate easily, the sand mold will be torn up when the cope is separated from the drag.

18. The head end of the brads can be cut off with diagonal cutting pliers and should be flush with the surface of the arms.

19. Sand all pieces with No. 1/2 and 2/0 sandpaper.

20. Apply wood filler and a good grade of shellac.

Casting

The next procedure in the construction of the book ends is to make a sand mold, melt the metal, and pour a solid casting. Castings may be made at a foundry or by yourself. Scrap bronze and brass can be purchased from junk yards or garages at a very low cost. About 25 or 30 pounds will be ample amount for one set of book ends. Old brass locks, bearings, bushings, valves, etc., are good. Do not use light thin scraps such as screen wire or thin sheet metal. This will burn up before it is hot enough to melt. The brass in the particular pair of book ends shown in this article was purchased at two cents a pound.

A knowledge of foundry practice is necessary before the making of a casting is attempted. A gas furnace to melt the bronze should also be available. Unless these two items are at the disposal of the craftsman, it is not advisable to attempt to pour the castings yourself. A foundry is usually found in any city, and the casting can be poured for only a few dollars' charge.

1. In casting the figure, all of the pieces for one book end can be cast in the same flask at one time. A good grade of No. 1 Albany molding sand should be used. The arms can be placed close to the head of the figure and gates cut to them from the body cavity to the arm cavity in the cope.

2. The sprue should be placed close to the foot of the body as shown in Figure 2. A 1-in. dia. sprue and a 2-in. dia. riser should be used to take care of the shrinkage and contraction of the metal as it cools. The melting point of brass is 1700 deg. F., and as it cools there is approximately 3/16 in. to the foot shrinkage.

3. Before pouring, add about two tablespoons of phosphorous copper to the molten brass to clean it and to separate the slag. This slag should be skimmed from the molten brass before pouring the casting. For best results, a 30-lb. capacity crucible for brass is used.

4. It is advisable to place a weight on the flask before pouring the metal in order to hold the cope down firmly on the drag.

5. In pouring the metal, care should be taken to keep a good even flow of molten metal going in the sprue. Never allow the flow to stop until the metal comes well up into the riser and sprue.

Finishing and Polishing the Castings

1. When the castings have cooled sufficiently, they can be removed from the flask and the arms separated from the body by cutting with a hack saw.

Cast bronze book ends

2. The castings are then ready for filing and finishing. A 10 or 12-in. flat bastard file is used for doing the rough filing. All the pieces are filed with this file first, and then gone over to give them a smooth file finish. A set of Swiss pattern needle files, a flat 8-in. smooth mill file, and an 8-in. No. 2/0 half-round Swiss pattern file, and a 6-in. No. 2 half-round Swiss pattern file are suggested for use in filing to a smooth finish. Any other type of metal files may be used, but those just listed are recommended.

3. When there are no file marks or rough places left on the castings, a piece of No. 1/2 emery cloth can be used to finish the castings.

4. File the surfaces perfectly flat where the arms and body connect.

5. A ⅛-in. dia. hole is drilled in each piece and a steel pin or dowel is inserted. This will help to keep the arms in place when they are soldered.

6. Before soldering, all pieces should be buffed with a muslin buffing wheel first and then a cotton flannel buffing wheel. A good grade of polishing compound should be used on both wheels. This operation will determine the amount of luster and beauty which the book ends will possess. Pains should be taken to get every bit of the metal polished as bright as possible.

7. After polishing, the pieces should be ready to solder together. Tin the pieces on all surfaces that fit together.

8. Fit the arms on the body and locate them in the correct position. The palm of the hands should be square with the base of the object and each arm should be the same height from the base line to the tip of the fingers. The arms can be held in position by placing a *C* clamp over the shoulders and clamping them to the body.

9. The whole figure is heated with a blow-torch or over a gas furnace until the solder melts and sweats the arms to the body.

10. Any surplus solder may be filed off and the whole figure rebuffed to retain the polished finish.

Plastic Parts

The base and upright pieces for the book ends can be made of any material and design that the craftsman chooses to use. The material used here is ¼-in. plexiglas cemented together and dyed black with a water soluble plexiglas dye. There are several good plexiglas dyes on the market in various colors and a little experimentation with any one of them will show that many beautiful effects can be obtained. The longer plexiglas is left in the dye, the darker it gets, and many shades from pale red, green, blue, yellow, etc., to deep, dark colors emerge from the solution.

Working with plexiglas is very much like working with wood. An article which appeared on pages 173 to 177, in the April, 1946, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, entitled "General Operations in the Working of Plexiglas," will be very helpful to the craftsman at this point.

General Assembly

1. The brass figure is mounted on the plexiglas base by drilling holes for the machine screws in the same location as those in the brass figure. Place the figure in the correct position on the plexiglas base and hold it with a wood vise or clamp.

2. Drill ⅛-in. holes through the plexiglas and into the brass just enough to mark the location on the brass.

3. The figure can then be removed and the correct size holes drilled and tapped in the brass. The holes in the plexiglas should be countersunk for the machine screws. Three No. 6-32 flathead brass machine screws ⅞ in. long are used in each book end. Drill a No. 36 hole and tap threads in the brass figure with a No. 6-32 bottoming tap. Be careful not to drill the holes through the hands of the figure. The two screws for fastening the arms to the upright pieces will probably have to be cut to the desired length.

4. A final polishing with a chemically treated brass polishing rag and a further wiping with a clean cloth will add to the luster of the brass.

5. After all the machine work and polishing has been done, the castings can be mounted on a board and sprayed with clear lacquer. Three or four coats sprayed on evenly will protect the finish and keep the brass from tarnishing. Otherwise, the figure will have to be polished periodically. If so desired, an antique appearance may be given to the book ends by brushing over the clean, bright metal with a solution of sal ammoniac and salt of sorrel in vinegar, and rubbing the surface dry, the operation being repeated as often as necessary. Another solution for the same purpose is made with sal ammoniac, cream of tartar, common salt, and silver nitrate.

6. The final assembly is done after each base and brass figure is completely finished.

METAL SPINNING PROJECTS

HAROLD S. BEAL
East Rochester, N. Y.

The projects illustrated are comparatively simple and worth while for the instructor or student who desires to spin metal. Besides the actual spinning technique they give the individual experience in accurate wood turning,

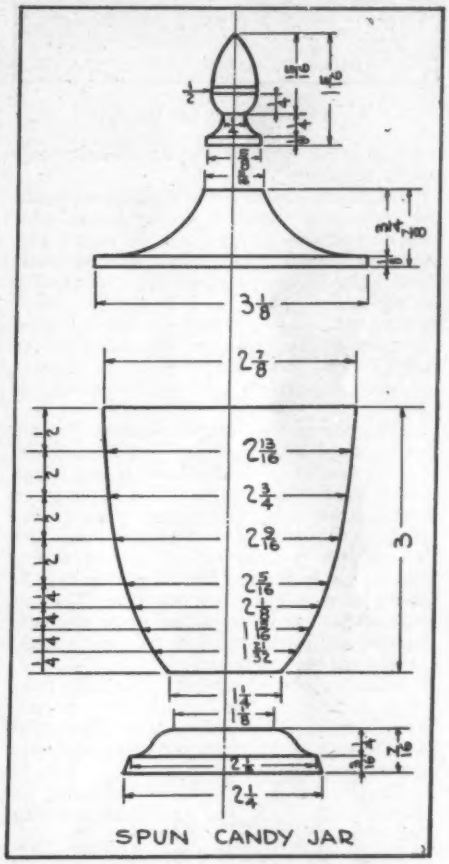


Fig. 1. Chuck dimensions for candy jar

Fig. 2. Chucks and spun projects

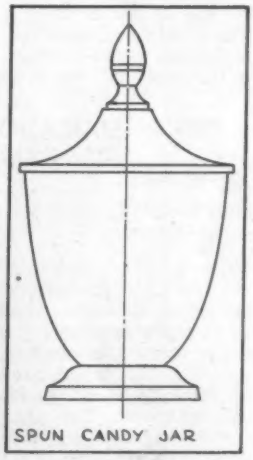


Fig. 3. Spun candy jar

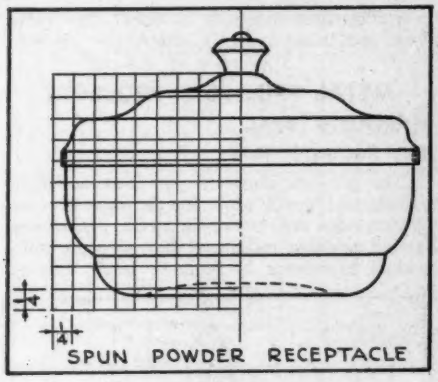


Fig. 4. Powder box

soft soldering with blowtorch, annealing, and metal finishing.

The chucks used in metal spinning are made of hardwood or metal, depending on the number of pieces to be spun and the nature and accuracy with which the work is being done. The pieces illustrated were spun over what is commonly known as a wooden one-piece chuck, that is, where the shell being spun increases in diameter from the closed end to the open end and where there are no recesses or beads to interfere with the removal of the shell.

The knob or finial may be turned of metal and soldered on or made of some hardwood. In the case of a wooden knob it is obvious that a hole will have to be drilled in the cover and a screw used. The cup or bowl of the candy jar is soft-soldered to the base. The base of the jar may be stiffened by rolling the edge, spinning the metal back, or by soldering in a disk to close the base. The top edge of both projects can be made more attractive and strengthened by rolling the edge, or spinning the metal back.

Both projects illustrated were spun from 20-gauge copper and fitted with turned, French finished rosewood finials. The metal was scratch finished on the lathe and lacquered inside and out.

The dimensioned drawing of the candy jar shows chuck sizes. The disk sizes (allowing for trimming) are as follows:

Candy jar — base 2¾ in. dia., bowl 5¼ in. dia., cover 3⅝ in. dia.

Powder receptacle — bowl 5½ in. dia., cover 4½ in. dia.

The half tone shows the finished pieces, and also the one-piece chucks used for spinning the candy jar, and candy-jar cover.

DRIVER EDUCATION AND TRAINING

L. G. TOPLISS
Senior High School
Fond du Lac, Wis.

Driver education and training in this course is to take into consideration classroom instruction in attitudes, responsibility, knowledge of traffic laws, safety and driving courtesy, as well as the mechanics of driving an automobile. It is hoped that it will make possible more intelligent, courteous, responsible, and safe drivers. The course is offered for credit to students who have drivers' licenses and to those who may soon be eligible or are now eligible for drivers' licenses. Our plan of driver education requires the parents or guardians of the students we enroll to supervise the mechanical driving training of the learner.

Driving education class, Senior High School, Fond du Lac, Wis.

This course has been approved by the State Department of Public Instruction and the Safety Division of the Motor Vehicle Department of the State of Wisconsin. It is through their splendid co-operation that the course is made possible to students in Fond du Lac.

Time, Place, and Scope of the Course

The Driver Education and Training Course meets one night a week for eight consecutive weeks at the senior high school. The first meeting includes all students and their parent or guardian driver supervisors. The general plan of the course is explained at this meeting.

Those Eligible for This Course

Any student in the senior high school who has a driver's license or any student who is of the proper age, and who has his or her parent's consent may take the course. Students who desire a driver's license and who are under the legal age may register for the course by special permission of the high school principal.

Aims and Objectives of the Course

1. To train new drivers in the mechanics of operating an automobile and especially in the attitudes, responsibilities, knowledge of traffic laws, safety factors, and driving courtesy.

2. To improve driving technique and general attitudes of present licensed drivers.

3. To inform drivers of the state traffic code, and of the driver's responsibilities under the law.

4. To cause an awareness on the part of the students of the mounting traffic problem in modern life and all of its related factors.

5. To make possible the acquiring of a driver's license on the completion of this course without taking the written and oral examination required on application for driver's license.

Course Requirements and Methods of Instruction

a) *General Requirements*
   1) Driver education (classroom instruction)
      (a) Sixteen hours of classroom instruction
      (b) Twelve units for the twelve weekly meetings
         (1) Instruction and explanation to parents and students
         (2) The motorcar
         (3–4) State driving code and traffic laws
         (5) Safety and sound driving practices
         (6) Preparation for driver's license
         (7–11) Driver classroom instruction to coincide with parent and guardian mechanical driver supervision
         (12) Summaries and examinations
   2) *Driver Training* (Home Supervision)
      (a) Lesson units in driver training for home instruction — the units to be furnished home supervisor by the school
      (b) Home driver training instruction to be given at least twice weekly and to be completed within sixty days
      (c) Guardian or parent home instruction supervisor must sign up to complete the training, and only by special permission of the instructor is there to be any change in the home supervisor during the course
      (d) Examination of driving ability at the close of the course by representative of the Motor Vehicle Department, State of Wisconsin, or one whom they may delegate to give the examination

b) *Methods*
   1) Classroom instruction with assignments, reading, recitation, reports, examination, lectures, and discussions
   2) Actual driving supervised by the home supervisor under the direction of the instructor for a minimum of 12 hours; 4 hours of which must be night driving.

Texts and Reference Materials

a) Regular texts: *Sportsmanlike Driving*, American Automobile Association; *Man and the Motor Car*

Credits and Grades

Grades will be given as in any regular high

school course on a unit percentage basis with a minimum passing grade of 70. A credit of one-half unit, which may be applied toward graduation from high school, may be earned by satisfactorily completing the course.

Six Important Reasons for New Driving Course

1. Age 16–17 has *9* times as many fatal accidents for each million miles driven as the age group of 45 to 50.
2. In Wisconsin, the *3* most serious traffic accidents in the state's history took 25 lives. Each of these accidents involved a driver under 20 years of age.
3. The record of youth as auto drivers is so serious that several major insurance companies are refusing to insure drivers of student age.
4. The age of youthful drivers is that age when skill, dexterity, and alertness are at peak efficiency, yet lack of *responsibility* nullifies the advantages of that efficiency.
5. The important thing in driver education is not the teaching of the *manipulation* of *levers*, but the development of proper attitudes.
6. Wisconsin has yearly: 750 auto deaths; 8000 auto injuries; 12,000 traffic accidents with more than $50 damage.

Anticipated Results of Driving Course

1. Improved driving practices
2. A thorough knowledge and understanding of traffic laws
3. Increased observance of the courtesies of the road
4. Greater respect for the safety of pedestrians, fellow drivers, and passengers
5. An appreciation of the responsibilities of driving

COFFEE TABLE

WALTER A. GRADY
George P. Phenix Training School
Hampton, Va.

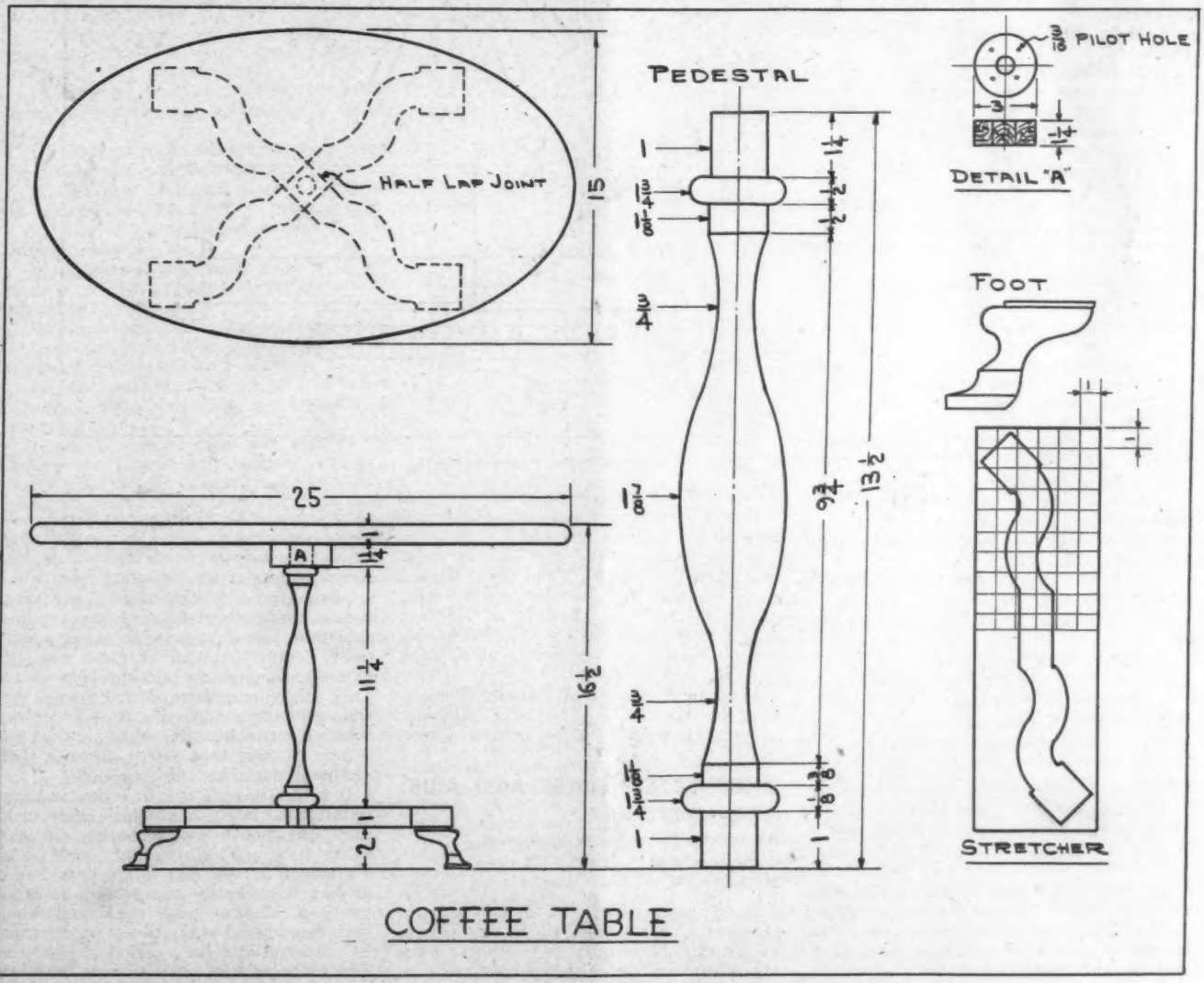
Sometimes it is necessary for the shop teacher to find a project that will capture the interest of the pupil who has developed a high degree of skills in the operation of all the power machinery in the shop. The coffee table described herewith affords a good project for such a pupil to use the skills which he has developed and keep the keen interest which he has in shopwork.

Method of Procedure

The Top

1. Select the face of each piece.
2. Arrange pieces to give a matched figure.
3. Joint the edges.
4. Test the joints to see if they come together.

Coffee table by Walter A. Grady



Details of coffee table by Walter A. Grady

5. Apply the glue and clamp.
6. Allow glue to set for 24 hours.
7. Remove pieces from clamps.
8. Cross plane to a true surface.
9. Plane with the grain.
10. Lay out the ellipse on the top.
11. Cut out ellipse on the band saw.
12. Clean up edges with spokeshave.
13. Run molding on shaper.
14. Place in clamps until assembled.

The Pedestal

1. Place stock in lathe.
2. Lay off horizontal measurements on a strip of ¼-in. plywood, 1 in. wide for a measuring stick.
3. Turn a cylinder, 1 15/16-in. in diameter.
4. Beginning at dead center end, lay off horizontal measurements with measuring stick.
5. Shape pedestal according to the plan.
6. Remove pedestal from lathe.
7. Cut off surplus from the end that received the live center.

The Stretchers

1. Make template for stretcher.
2. Lay template on stock and draw the desired curves.
3. Cut out on band saw.
4. Square up ends with block plane.
5. Clean up curved surfaces with rasp and chisel.
6. Make half-lap joint at center of stretchers.
7. Assemble stretchers.
8. Bore hole in the center of stretchers with 1-in. auger bit.
9. Disassemble the stretchers.
10. Apply glue.
11. Reassemble stretchers.

The Feet

1. Run molding on shaper.
2. Cut molding into eight pieces 3 in. long.
3. Miter one end of each piece with miter saw and clamp.
4. Make template of trailing edge of foot.
5. Lay template on the flat side of the molding and transfer curve.
6. Cut curve on band saw.
7. Apply glue and clamp in metal miter saw.
8. Allow to set for twelve hours.
9. Remove from clamps.

The Glue Block (Detail A)

1. Lay out circle on stock 3 in. in diameter.
2. Cut out on band saw.
3. Clean up with rasp.
4. Bore a hole in the center using 1-in. auger bit.
5. Bore four 3/16-in. holes using drill press.

Assembling the Table

1. Glue and screw the feet to the stretchers with No. 7 by ⅞-in. screws.
2. Reinforce feet with glue blocks on the inside.
3. Glue pedestal in stretchers.
4. Glue block (Detail A) to pedestal.
5. Glue and screw block (Detail A) to the underside of the top.

Bill of Material

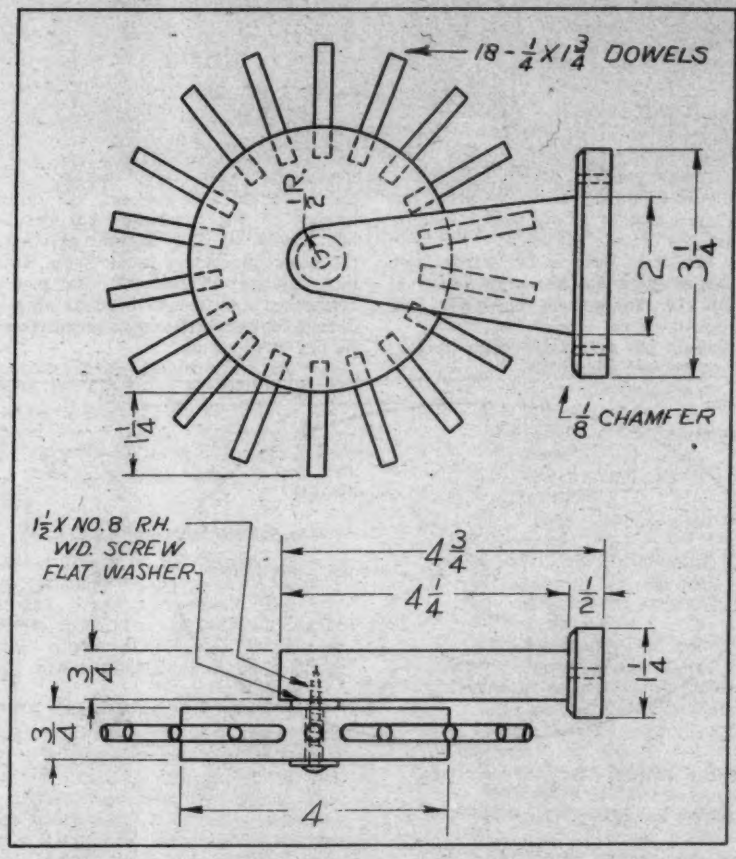
No. of pcs.	*Name*	*Size*
1	Top	1 x 15 x 25
1	Pedestal	2 x 2 x 16
2	Stretcher	1 x 6 x 20
1	Pedestal block	1 x 4 x 4
1	Feet	1 x 2 x 30

Give the table a thorough sanding and apply the desired finish. The writer favors mahogany for the construction of this project, but it can be built of some other cabinet wood to match other home furnishings.

TIE RACK

DAVID O. TAXIS
Junior High School
Downey, Calif.

The old conventional type tie rack with a 12-in. backboard and a dowel of about the same length has become very trite. When a project has lost its boy appeal, it naturally fails to do its job of stimulating interest.



Tie rack

The tie rack shown in the illustration will undoubtedly challenge any boy.

In the layout of the disk into 18 equal parts, there is a combination of things learned in the mathematics classroom with the skills sought in the shops. This is an excellent project to introduce the use of the dowel jig and the depth gauge. The dowels can be glued or forced into place.

A minimum amount of material is necessary for construction. This is of particular advantage today with lumber being so scarce.

SHOP SAFETY RULES AND AIDS

JOSEPH MERCHANT
Alexander Hamilton Vocational High School
Brooklyn, N. Y.

Every shop teacher has a definite need for a variety of safety rules that he can issue to his students. These rules are even more desirable when they are further supported by an objective safety test and a student safety statement.

The shop teacher's safety education program for his activity is detailed and complex if it is to combine effectiveness, comprehensiveness, and a degree of personal protection against possible accident litigation. Perpetual experimentation in shop safety indicates the necessity to pursue certain fundamental procedures. First, it is good pedagogy to write all safety rules in the form of positive statements rather than in terms of negative admonitions. Second, every machine should have affixed a series of specific safety rules. Third, in close proximity to auxiliary equipment, such as hand tools, stakes, and furnaces, there should be posted appropriate safety suggestions. Fourth, from all of these rules, the generalized shop safety rules should be chosen. They are representative of the over-all general safety rules applicable to shop activity. Finally, every student should be provided with a copy of these shop safety rules for study and insertion in his notebook.

It is the teacher's task to review and illustrate all the safety rules which apply to his shop. He should also administer the shop safety tests, and each student should obtain a grade of 100 per cent in the tests. Failure to do so provides the teacher with an opportunity to discover pupil weaknesses and a basis for remedial work. All test papers should be rated and filed for a period of two years. The following trio of safety aids have been

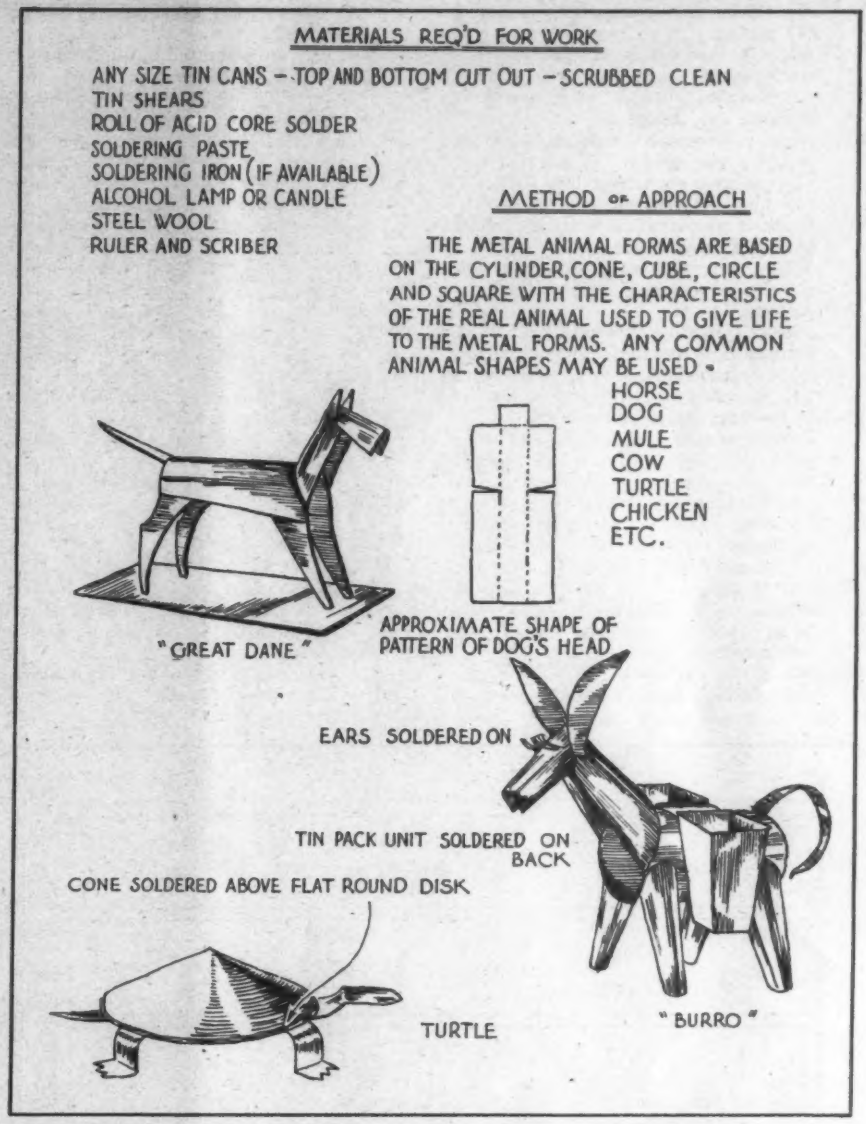
established as an integral part of our safety education program:

Shop Safety Rules

1. Students are permitted to use hand tools, machines, and auxiliary equipment only after receiving a demonstration, passing the safety test, being properly attired, and obtaining the teacher's consent.
2. Only one student at a time is permitted to use individual hand tools, machines, and other auxiliary equipment.
3. Students are required to read and understand the specific safety rules posted on or near shop equipment for their own personal safety and for the protection of others.
4. Each student should familiarize himself with the names and functions of hand tools, machines, and auxiliary equipment.
5. A student's personal safety is far more important than any job or machine.
6. A clean, methodical, and systematically organized shop promotes safety.
7. Students should concentrate on their own work and apply safety precautions when using shop equipment.
8. Students are permitted to use shop equipment for which they have met qualifying requirements only during the interval that the activity is in session.
9. Safety is promoted by learning to use tools and machines for the specific purposes for which they were designed.
10. Knowing how to use shop equipment includes knowing the accompanying safety rules.
11. Sharp pointed tools and materials should be carried with points downward.
12. Use only tools and machines that are in perfect condition.
13. Lift only objects that are within your lifting capacity.
14. Machine safety guards must be in protective position while that machine is in operation.
15. Hand tools and other equipment should be properly anchored when returned to prearranged designated places.
16. The machine must be at rest before cleaning, oiling, adjusting, or repairing is started.
17. Be a good neighbor and remove any hazard that may cause accidents.
18. Wash your hands at the end of every shop session and immediately after using acids.
19. Each student has the responsibility to use shop equipment properly, cautiously, and wisely.
20. The operator must remain with power-driven machinery while it is in motion.
21. Students are directed to exercise social amenities and gentlemanly decorum in the shop.
22. Fire drills are an emergency precaution to safeguard human lives.
23. Inform your neighbor when he indulges in unsafe practices or report it to the teacher for correction.
24. Whenever you need assistance inform the teacher.
25. All accidents must be reported to the teacher immediately.

Shop Safety Test

Name: .....
Date: .....
Class: .....
Rating: .....
Address: .....
Subject: .....


MATERIALS REQ'D FOR WORK
ANY SIZE TIN CANS — TOP AND BOTTOM CUT OUT — SCRUBBED CLEAN
TIN SHEARS
ROLL OF ACID CORE SOLDER
SOLDERING PASTE
SOLDERING IRON (IF AVAILABLE)
ALCOHOL LAMP OR CANDLE
STEEL WOOL
RULER AND SCRIBER
METHOD OF APPROACH
THE METAL ANIMAL FORMS ARE BASED ON THE CYLINDER, CONE, CUBE, CIRCLE AND SQUARE WITH THE CHARACTERISTICS OF THE REAL ANIMAL USED TO GIVE LIFE TO THE METAL FORMS. ANY COMMON ANIMAL SHAPES MAY BE USED -
HORSE
DOG
MULE
COW
TURTLE
CHICKEN
ETC.
"GREAT DANE"
APPROXIMATE SHAPE OF PATTERN OF DOG'S HEAD
EARS SOLDERED ON
TIN PACK UNIT SOLDERED ON BACK
CONE SOLDERED ABOVE FLAT ROUND DISK
TURTLE
"BURRO"

Metal animals submitted by Kenneth R. Kuemmerlein, Ladysmith, Wis.

Teacher: .....
Station No.: .....

Directions: Each of the ensuing incomplete statements is followed by four numerically tabulated words or phrases. To the right of each complete statement number, place the numeral of the word or phrase that completes the statement most accurately.

Samples: 1. *4* A brilliant mind cannot flourish without: (1) money, (2) happiness, (3) success, (4) health.

2. *1* Napoleon Bonaparte said, success is the most convincing talker in the: (1) world, (2) universe, (3) country, (4) heavens.

Begin Here:

1.—Students are permitted to use hand tools and machines after: (1) inspecting them, (2) becoming interested, (3) passing the safety test, (4) knowing their names.

2.—Fire drills are necessary and desirable because they may: (1) cause confusion, (2) provide a rest period, (3) teach silence, (4) save lives.

3.—When you discover any safety hazard in the shop you should: (1) leave it, (2) remove it, (3) tell your neighbor, (4) act surprised.

4.—You should read the specific safety rules posted on shop equipment because it: (1) wastes time, (2) makes you read, (3) helps prevent accidents, (4) is required.

5.—Shop decorum is understood to be: (1) courteous and gentlemanly, (2) noisy and conspicuous, (3) idleness and dawdling, (4) interfering with others.

6.—You should know the names and functions of hand tools and machines because it: (1) eliminates all breakage, (2) sounds intelligent, (3) helps prevent accidents, (4) is interesting.

7.—You may lift heavy objects if they are within: (1) reach, (2) lifting capacity, (3) accessibility, (4) the shop.

8.—The condition of tools and machines before using them should be: (1) new,

(2) old, (3) somewhat damaged, (4) perfect.

9.—When a machine is in operation the safety guards must be: (1) removed, (2) installed, (3) in their protective position, (4) tightened.

10.—When your neighbor indulges in unsafe practices you should: (1) threaten him, (2) endeavor to correct him, (3) ridicule him, (4) reprimand him.

11.—Students are permitted to use hand tools and machines after: (1) watching others, (2) receiving a demonstration, (3) understanding them, (4) laying out patterns.

12.—Should you experience any kind of an accident first inform: (1) your friend, (2) the school doctor, (3) the teacher, (4) your private physician.

13.—It has been found that one way of preventing accidents is to: (1) think of other things, (2) talk to your neighbor, (3) concentrate on your work, (4) do two things at one time.

14.—Cleaning, oiling, adjusting, or repairing a machine must be done when it is: (1) in motion, (2) needed, (3) started, (4) at rest.

15.—Nothing in the shop precedes the safety of a: (1) student, (2) machine, (3) job, (4) furnace.

16.—When you operate a power-driven machine you should: (1) stay with it, (2) leave it, (3) assist others, (4) do other work.

17.—Students are permitted to use hand tools and machines after they obtain the: (1) proper attitude, (2) necessary skill, (3) job sheet, (4) teacher's consent.

18.—When you are in difficulty and need assistance inform: (1) your parents, (2) the teacher, (3) an associate, (4) the public.

19.—In returning equipment to prearranged designated places be sure they are properly: (1) anchored, (2) tilted, (3) seen, (4) posted.

20.—Students are permitted to use hand tools and machines when they are: (1) properly attired, (2) ready, (3) inclined, (4) anxious.

21.—When carrying sharp pointed tools or materials the points should be: (1) upward, (2) downward, (3) to the side, (4) to the front.

22.—A clean and well-organized shop is advantageous because it encourages: (1) carelessness, (2) safety, (3) disorder, (4) slovenly habits.

23.—Knowing the specific purposes for which tools and machines are designed makes for: (1) accident prevention, (2) poor craftsmanship, (3) irresponsibility, (4) fear.

24.—After meeting qualifying requirements to use equipment you may engage in the activity: (1) when the teacher is absent, (2) before the session begins, (3) during the session, (4) after the session ends.

25.—Individual hand tools and machines can be used at one time by: (1) one pupil, (2) two pupils, (3) three pupils, (4) four pupils.

Student's Safety Statement

I have received a copy of the shop safety rules for study and insertion in my notebook.

I have read and carefully studied the specific safety rules posted on every machine and near other shop equipment.

I fully understand all the safety rules applicable to this shop. I now feel that I am conversant with sufficient safety instruction to warrant using shop equipment.

My knowledge of shop safety is reasonably indicated by the percentage grade on my safety test.

.....

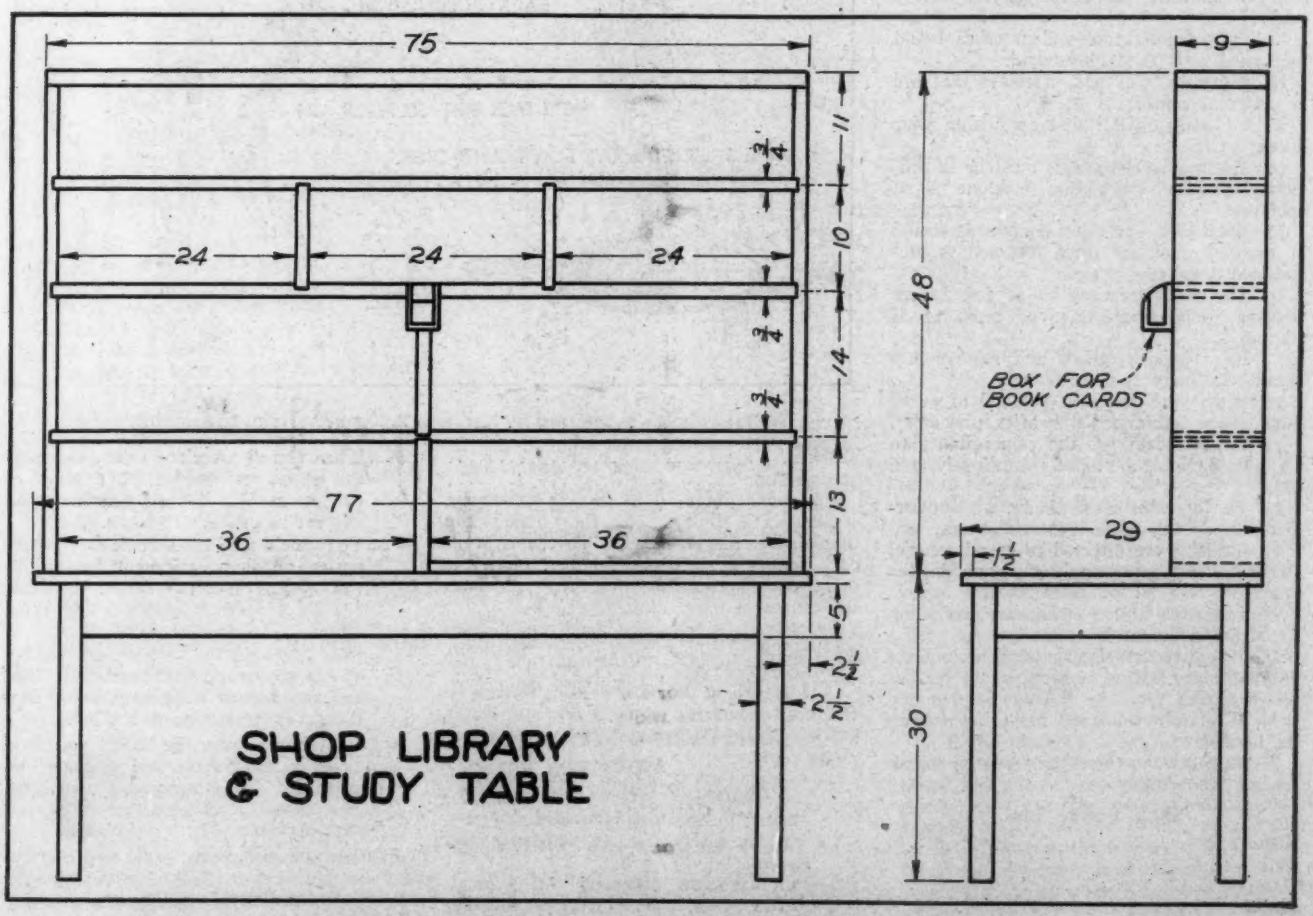
pupil signature

RESINOUS SEALANTS FOR POROUS METAL CASTINGS

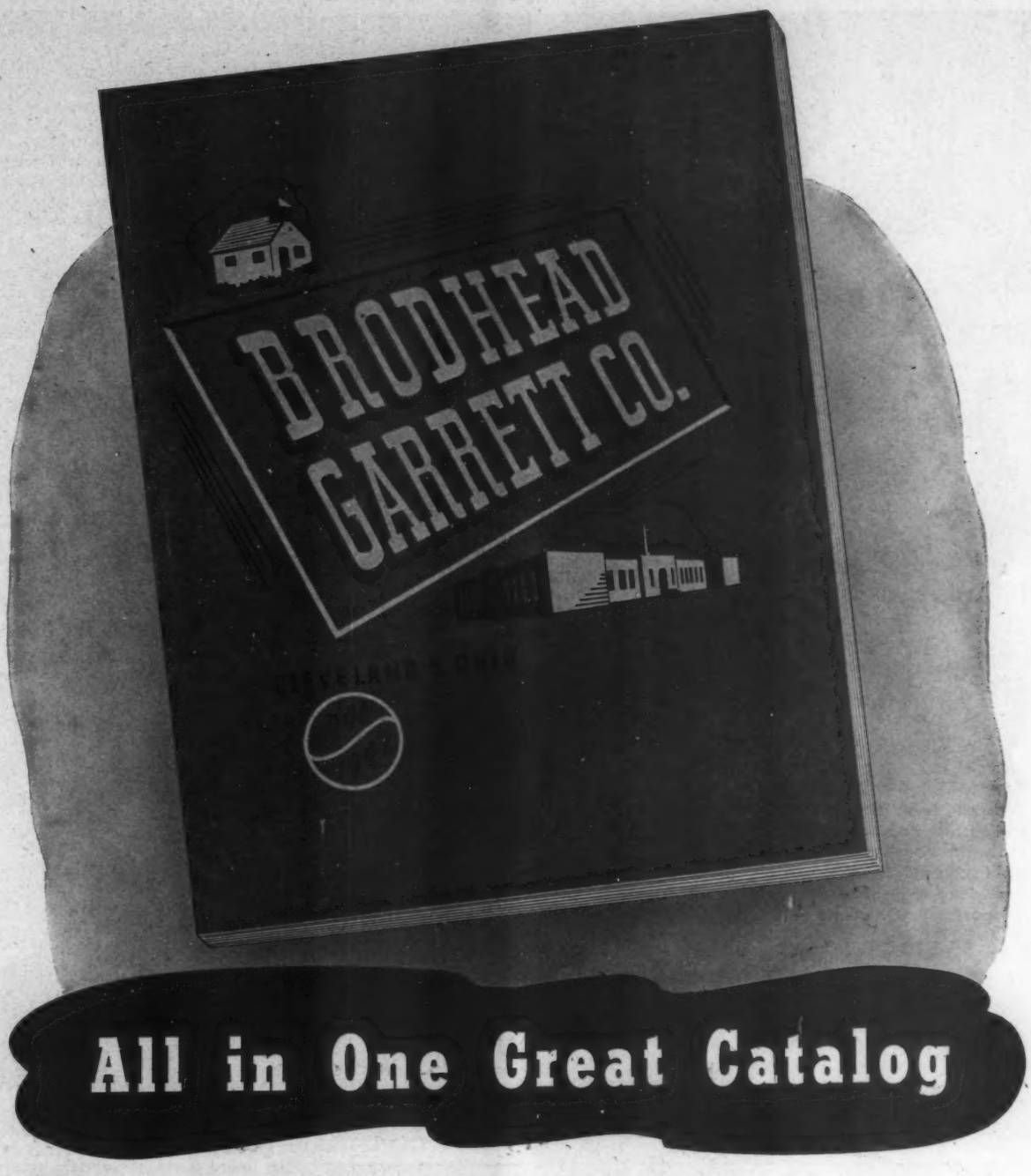
(This information is taken from the *Technical News Bulletin* of the National Bureau of Standards.)

The production of pressure tight castings is

(Continued on page 18A)



Shop library and study table by Louis Barocci, High School, Cudahy, Wis.



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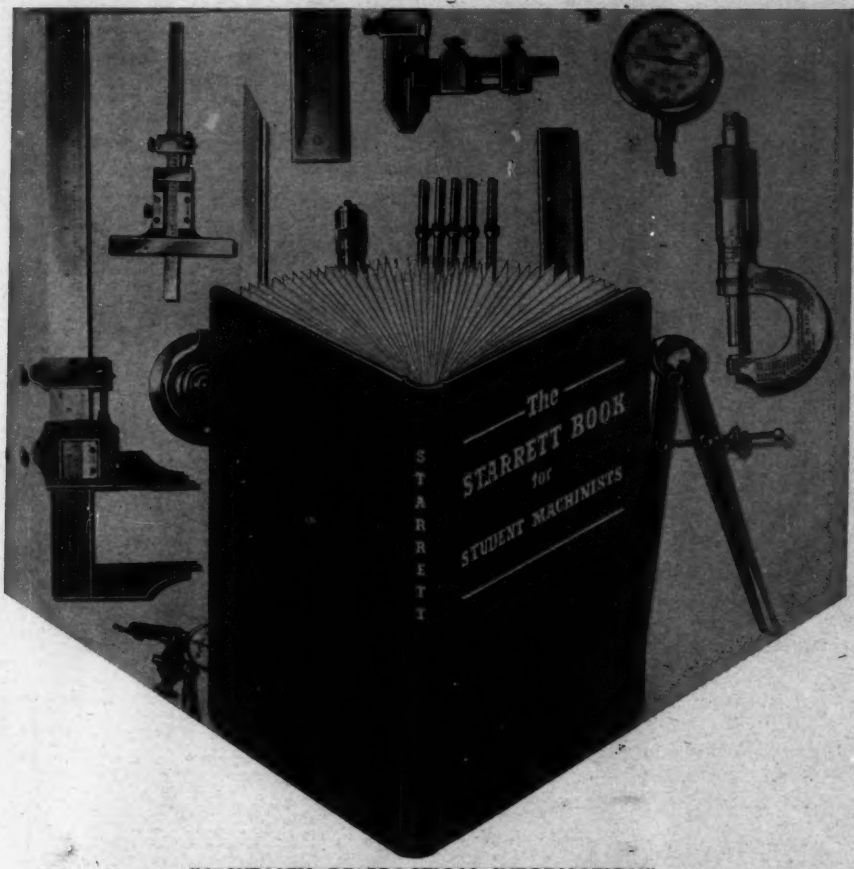

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(Continued from page 44)

a foundry problem that frequently presents considerable difficulties. During the war the production schedules for certain fittings, housings, and other castings that had to be pressure tight were in many instances hampered because of porosity rejections. It was suggested that many of these rejected castings might be salvaged by impregnation with suitable resins. Although considerable work had been done in this field, very little useful information has been published.

Because of the widespread interest in this subject an investigation of the suitability of 14 synthetic resins for repairing porous castings was carried out at the Bureau. This work is described in the September *Journal of Research* (RPI740) by Vernon C. F. Holm, of the Bureau's Division of Metallurgy.

Porous bushings of aluminum, a copper-silicon alloy, and a red brass were cast especially for this purpose in the Experimental Foundry, some to exact size, 2 by 2-in. cylinders with ⅛-in. walls, others oversize and machined to this size. Specimens were impregnated with the resins by the vacuum-pressure method, and the sealing efficiencies of the resins determined by hydrostatic pressure tests.

The two most promising sealants, a phenolic resin in alchohol solution and a styrene-polyester resin, were selected for further tests. Specimens sealed with these resins were exposed to hot motor oil, high octane gasoline, boiling water, elevated temperatures, and thermal shock. The influence of moderately high pressure on specimens treated with these two sealants also was determined. The styrene-polyester resin was more satisfactory for sealing castings that were exposed to petroleum products or subjected to thermal shock conditions. The phenolic resin was somewhat superior in exposure to elevated temperatures and specimens sealed with this resin withstood higher pressures without leaking. Both resins were reasonably stable in exposure to boiling water.

Although impregnation with sealants may be a useful method for rendering certain types of porous castings pressure tight for limited service conditions, the results of this investigation suggest that, in general, the foundryman should attempt to avoid porosity in castings rather than to cure it.

Personal News

RECEIVES DOCTOR OF EDUCATION DEGREE

The Doctor of Education degree was conferred on G. Harold Silvius by the Pennsylvania State College on September 18. He completed the work for the B.S. degree at the Stout Institute, with a major in industrial education in 1930, and the requirements for the M.A. degree in 1936 at Wayne University.

His dissertation is entitled: *Instructional Units for Professional Courses in Undergraduate Industrial Arts Teacher Education.* This study is a scientific analysis of the activities performed by outstanding industrial-arts teachers throughout the United States, to ascertain units of instruction for professional courses in undergraduate industrial-arts teacher education. He reported on this study on Tuesday evening, December 3, before the National Association of Industrial Teacher Trainers during the A.V.A. convention in St. Louis.

—Studio of J. L. Hudson Co.

Dr. G. H. Silvius

Dr. Silvius is associate professor and chairman of the department of industrial education, Wayne University. He taught industrial arts in the Detroit schools from 1929 to 1935 when he became a critic teacher for Wayne University. He served in this capacity until he was promoted in 1941 to Mr. Earl Bedell's staff as supervisor of industrial arts and assistant professor of industrial education. On this assignment he had in his charge the industrial-arts program in seventy-five Detroit schools. During the 1938 and 1940 summer sessions he was a guest instructor at Kent

(Continued on page 20A)

THE BIG SHOT—No. 85 X-acto Tool Chest. A knife, a tool for every job. Designed for safety and sure control. Includes: 3 X-acto Knives; complete blade assortment; sander; stripper; planer; saw; drills and holders; ruler. Complete in desk-drawer-size wooden chest . . . $12.50.

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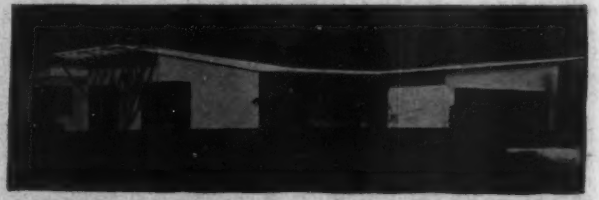
Thomas Galloway, model consultant, working on detail of scale-model miniature. "A No. 85 X-acto Tool Chest for every new employee's work bench" is on the schedule for this busy studio.



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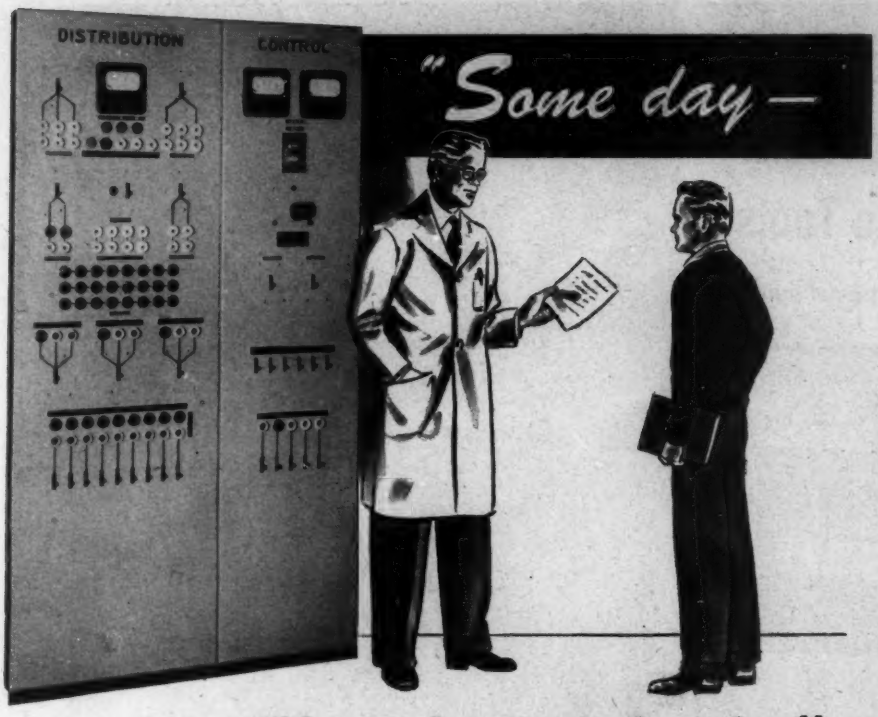

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(Continued from page 18A)

State University. He also served on the summer faculty at the Pennsylvania State College in 1941 and 1942.

He is a consistent contributor to the professional magazines in his field. He is coauthor of the *Student Planning Book for Industrial Arts and Vocational Classes, Safe Work Practices in Woodworking*, and a number of publications published by the Detroit schools.

He holds memberships in Michigan Industrial Education Society (chairman of research committees), Michigan Industrial Training Council, American Vocational Association, Manual Arts Conference, National Association of Industrial Teacher Trainers, National Association of Technical Schools and Institutes, American Industrial Arts Association, Michigan Vocational Association, and National Education Association. He is a member of Mu Sigma Pi (past president) Iota Lambda Sigma, and the Phi Delta Kappa fraternities.

♦ HARVEY W. WAFFLE, formerly a teacher at Davenport, Iowa, has joined the faculty of the Maine Township High School, Des Plaines or Park Ridge, Ill. He will teach architectural, machine, and mechanical drawing.

Mr. Waffle completed his work for the Ph.M. degree last summer at the University of Chicago.

♦ WALTER BROWN of Hannibal, Mo., joined the staff of the trade and industrial education division in July. Previous to his employment in the state office, Mr. Brown was co-ordinator and supervisor of trade and industrial education in the Hannibal Public Schools, Hannibal, Mo. He is a graduate of Northeast Missouri State Teachers College, and received his master's degree in industrial education from the University of Missouri in 1943.

♦ SHRIVER L. COOVER was named chief of the field party of ten North American subject specialists who are co-operating with the Chilean Ministry of Education in the reorganization of the secondary education program in Chile.

Headquarters for this group will be in Santiago, Chile, where the program will be tried out in four experimental high schools (liceos).

The new methods and subject matter is being introduced to the schools of the provinces by extension and summer school courses, and by the work of members of the committee directly in the classroom.

During January and February, 1946, a special course for secondary teachers was held at the Technical University of Santa Maria at Valparaiso, Chile. A similar class will be held at Concepcion, Chile, in January, 1947.

Mr. Coover will return to State Teachers College, California, Pa., sometime in 1947.

♦ HUGH L. OAKLEY, formerly director of industrial arts and vocational education of the Lexington, Ky., public schools, completed his work for the master's degree in industrial education at the University of Missouri during the 1946 summer session, and is now head of the new department of industrial education at Murry State Teachers College, Murry, Ky. Mr. Oakley was discharged from the navy as a lt. commander in January of this year after serving four years in naval technical training at Chicago and Memphis, where he was in charge of Aviation Line Maintenance Schools.

♦ M. RAY KARNES, formerly of North Texas State Teachers College, Denton, has assumed his duties as assistant professor of industrial education at the University of Missouri, where he is also completing the work for his doctor's degree. During the war years Mr. Karnes served as instructor and assistant director of the instructor-training department, The Armored School, Fort Knox, Ky., and later as commanding officer of an Engineer Utilities Detachment in Japan.

♦ JOHN H. ERICKSON of Monett, Mo., has been elected assistant professor of Industrial arts at Georgia Teachers College, Collegeboro. During the war he served three years in the navy, working with aviation tools and supplies and as a radio technician. He was graduated with a major in industrial education from the University of Missouri before entering the navy and was in attendance during the 1946 summer session.

♦ ORVILLE E. WHITE, formerly of Calgary, Alberta, Canada, has recently taken up his new duties with the Montreal Protestant Central School Board as industrial-arts woodwork specialist at the Verdun High School.

Prior to the war he had charge of the industrial-arts program in the City of Medicine Hat, Alberta. After serving over six years in Canada and England, mainly in technical instructional duties, Mr. White returned last year to advanced studies in his work, under the Veterans' Rehabilitation measures. He was employed by the University of Alberta for the 1946 summer session to offer a lecture course on "Consumer Education in Industrial Arts."

♦ EWELL W. FOWLER of Charleston, Ill., is on leave from his position in the industrial-arts department of the Eastern Illinois Teachers College and is pursuing graduate work toward the doctor's degree in industrial education at the University of Missouri. He was discharged from the army early this year.

♦ R. WAYNE ADAMS is on leave from his position in the department of industrial education, North Texas State Teachers College, Denton, and is now part-time instructor and graduate student in the department of industrial education at the University of Missouri, where he plans to com-

(Continued on next page)

(Continued from previous page)

plete the work for his doctor's degree in June. Mr. Adams served as instructor and assistant director of the instructor-training department, Armored School, Fort Knox, Ky., during the war.

♦ ROBERT H. HARTLEY, formerly of Brunswick, Ga., is now co-ordinator of diversified co-op training at Waycross, Ga. Since being discharged as a first lieutenant from the U. S. Marine Corps in 1945, he has been in attendance in the graduate school of the University of Missouri, majoring in industrial education.

♦ W. C. BICKNELL, originally of Texas, and later of New Mexico, Nebraska, and Missouri, has resigned his position as director of mechanical arts for veterans at the University of Missouri and is now professor and chairman of the department of industrial education at Southern Illinois Normal University, Carbondale. He received his doctor's degree in industrial education from the University of Missouri in 1942, where he also taught in the University High School for a number of years. During the war years, he worked in the Naval Training School for Diesel Engine Operation and Maintenance at the University of Missouri, and later, as supervisor in the production engineering department of Pratt and Whitney Aircraft Corporation, Kansas City.

♦ JOHN OWEN HARLAN of Charleston, Ill., has joined the staff of the New York State College for Teachers at Buffalo. Last year he served as part-time instructor of industrial education at the University of Missouri while working toward his doctor's degree. Mr. Harlan received his M.A. degree from the University of Minnesota in 1945. Prior to going to Minnesota, he worked for two years as an instructor in Naval Technical Schools at Norman, Okla., and Mare Island, Calif.

♦ J. V. MELTON, formerly of Texas, Ohio, Missouri, and Washington, D. C., is now associate professor of industrial education at Louisiana State University, Baton Rouge. Dr. Melton was discharged from the navy in May with the rank of lieutenant, after serving three years as a specialist in electronics. After being graduated from the University of Missouri in 1940 with a major in industrial education, Dr. Melton worked as a supervisor with the N.Y.A. until entering the navy.

♦ EVERETT E. KOEHLER has been appointed instructor of electricity and automobile engines at the State Teachers College, Fitchburg, Mass.

His previous teaching experience was obtained at State Teachers College, California, Pa., and at the high school at Jenkintown, Pa., where he served as director of industrial arts.

He has a B.S. degree from State Teachers College, Buffalo, N. Y., and an M.A. degree from New York University. He also has done some work at the University of Pennsylvania.

♦ BERRY E. MORTON of St. Louis, Mo., has been appointed assistant professor of industrial arts at the Oswego State Teachers College, Oswego, N. Y. Mr. Morton received his master's degree in industrial education from the University of Missouri in 1942, after which he taught in the St. Louis public schools until entering the army, where he attained the rank of captain. At the time of his discharge, Mr. Morton was Director of Training, Civilian Personnel, Headquarters, Base X, in Manila.

♦ FRANK E. ROBINSON, formerly instructor of industrial arts, University High School, University of Missouri, is now instructor of industrial arts at the State Teachers College, California, Pa. He received his master's degree from the University of Missouri in 1945.

♦ CHARLES A. ELLIOTT, after receiving his master's degree in industrial education from the University of Missouri, has returned to the Eastern Illinois State Teachers College at Charleston, as instructor of machine shop and bench metalwork. During the war Mr. Elliott served three years as instructor of link trainer and automatic pilot with the U. S. Army Air Force. Prior to entering the service, he worked with the N.Y.A. in Illinois and with the schools of Cleveland, Ohio.

♦ GARLAND G. HAMMER, after serving three years in the instructor-training department of the Naval Air Technical Training Center, Chicago, and a year as executive trainer with the General Motors Corporation, is now assistant professor of industrial education at the University of Oklahoma. Prior to his going to Chicago, Mr. Hammer was instructor of industrial arts in the Dallas public schools. He received his master's degree in industrial education at the University of Missouri and has completed the course work for his doctor's degree.

♦ RALPH E. STUCKI, formerly instructor at Dana Junior High School, San Diego, Calif., has joined the industrial education staff of Louisiana State University, Baton Rouge, La.

♦ CARL ANDERWALD, former lieutenant in the U. S. Navy and supervisor of war production training in the state department, Albany, N. Y., is now with the Bureau of Industrial and Technical Education, supervising veteran training in the State Technical Institutes.

♦ GORDON GIFFORD transferred from the State Civil Service Commission to the Bureau of Industrial and Technical Education, Albany, N. Y., as a supervisor of veterans education.

♦ JAMES DAILEY, formerly director of vocational education in Lockport, and lieutenant in the U. S. Navy, is now with the state department, Albany, N. Y., supervising veteran training.

♦ EMERSON NEUTHARDT, formerly of the Bethlehem Central School at Delmar, is now on the faculty of State Teachers College at Buffalo, N. Y. He will be working with Ed Morrice in supervision of teachers in training, and will teach courses in methods and materials.

♦ S. H. ASPDEN, machine-shop instructor in the Natchitoches Trade School, is teaching courses in machine shop and general metals two nights per week at Natchitoches, La.

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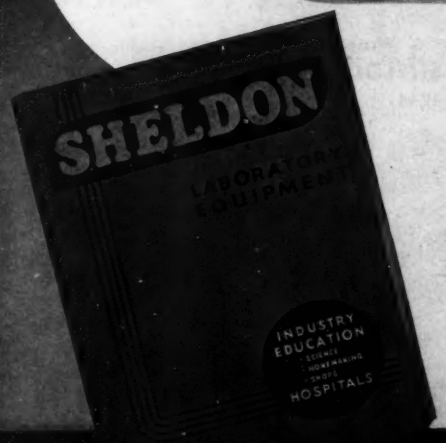

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Association News

♦ The Manual Arts Conference of the Mississippi Valley held its thirty-third annual meeting at Hotel Southmoor, Chicago, Ill., November 14, 15, and 16, 1946.

The active membership of this important organization consists of teacher trainers from the states of Alabama, Arkansas, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nebraska, North Dakota, Ohio, Oklahoma, South Dakota, Tennessee, Texas, and Wisconsin.

The general chairman of all sessions of the conference was Dr. Verne C. Fryklund, president of The Stout Institute, Menomonie, Wis.

The chairman of the Thursday (November 14) morning meeting was Dr. Thomas Hippaka, Iowa State College, Ames, Iowa. The subject discussed was "Methods and Procedures for Teachers." The speakers were Dr. Hippaka; L. L. Gore, Peabody College, Nashville, Tenn.; and Victor Randall, State Teachers College, Huntsville, Texas.

Dean C. A. Bowman, The Stout Institute, Menomonie, Wis., was the chairman of the afternoon session. The subject for discussion was "The Surplus War Materials Problem and Its Solution."

The speakers were Clyde A. Bowman; Walter Klehm, State Teachers College, Charleston, Ill.; and DeWitt Hunt, Oklahoma A. & M. College, Stillwater, Okla.

Dr. William T. Bawden, State Teachers College, Pittsburg, Kans., was the chairman of the Friday morning session. The topic at this meeting was "The Origin, Purposes, and Progress of the Manual Arts Conference." The speakers were Dr. Bawden; Arthur B. Mays, University of Illinois, Urbana, Ill.; and A. F. Siepert, Bradley Polytechnic Institute, Peoria, Ill.

The afternoon conference was under the chairmanship of Dr. Homer J. Smith, University of Minnesota, Minneapolis, Minn.

The subject for discussion was "What's Ahead for the Manual Arts Conference?"; and the speakers were Ammon Swope, Purdue University, Lafayette, Ind.; and Dr. L. V. Newkirk, Chicago Public Schools, Chicago, Ill.

Milo Oakland, State Teachers College, DeKalb, Ill., was the chairman of the Saturday morning session, at which the subject, "Preparation, Procurement, and Use of Supplementary Teaching Materials," was discussed. Sylvan Yager, State Teachers College, Terre Haute, Ind.; and R. W. Whalin, State Teachers College, Richmond, Ky.; assisted Milo Oakland in the presentation of the topic.

At the business meeting the nomination and election of new members was taken up, and the program for next year's program was discussed.

♦ The meeting of the Wisconsin Industrial Arts Association was held on Thursday, November 7, at Milwaukee, Wis., in conjunction with the annual meeting of the Wisconsin Education Association.

Karl F. Ludemann, president of the W.I.A.A., was the chairman. L. A. Rumsey, district superintendent of vocational rehabilitation, spoke on "Rehabilitation of the Handicapped Civilian." He emphasized the need and significance of this type of work and explained how it was done in Wisconsin.

E. H. Gibson, veteran's liaison Officer, State Board of Vocational Education, explained how "G.I. on the Job Training" was carried out and showed the scope of the work in Wisconsin.

Dr. Verne C. Fryklund, president, The Stout Institute, Menomonie, Wis., in his address on "Education of the Industrial-Arts Teacher," laid special stress on the professional studies and the need of maintaining high standards.

Industrial-arts group meetings were held Friday afternoon on the general metal shop, the machine shop, mechanical drafting, one-man general shop, printing and woodworking.

The Stout Alumni Dinner on Friday evening was a huge success. Earl Loatch arranged the dinner and acted as toastmaster. The main speakers were Dean Michaels, Dean Bowman, and the national president of The Stout Alumni Association, D. K. Mereen.

The Epsilon Pi Tau breakfast was held Friday morning at the Schroeder Hotel.

♦ The Executive Council of the Associated Guilds of Teachers of Shopwork of New York City held its first meeting of the fall on September 9, at the board of education office, 110 Livingston St., Brooklyn 2, N. Y. The following officers were elected for the year 1946–47: president, John M. Hurley, 301 Battery Ave., Brooklyn, N. Y.; vice-president, Fred P. Berrian, 219 Potter Ave., Staten Island 2, N. Y.; treasurer, Charles C. Passiglia, 22 Jagoe St., Bergenfield, N. J.; recording secretary, Charles Denely, 52–10 241 St., Douglaston, L. I., N. Y.; corresponding secretary, Walter Lockwood, 241 Mosholu Parkway North, Bronx 67, N. Y.

♦ Utah industrial-arts teachers recently had an opportunity to meet at the annual breakfast of the Industrial-Arts Section of the Utah Vocational Association. This meeting was held in conjunction with the Utah Educational Association Convention on Friday, October 11, and convened in the Seagull Room of the Hotel Temple Square in Salt Lake City, Utah. Marcus Sorenson and Glenn Bunten, industrial-arts teachers at Logan Senior High School and president and vice-president of the Industrial-Arts Section respectively, were in charge of the arrangements for the meeting.

Speakers for the occasion were Dr. E. Allen Bateman, state superintendent of public instruction of Utah, who spoke to the teachers on the value of industrial arts as a part of general

(Continued on page 24A)

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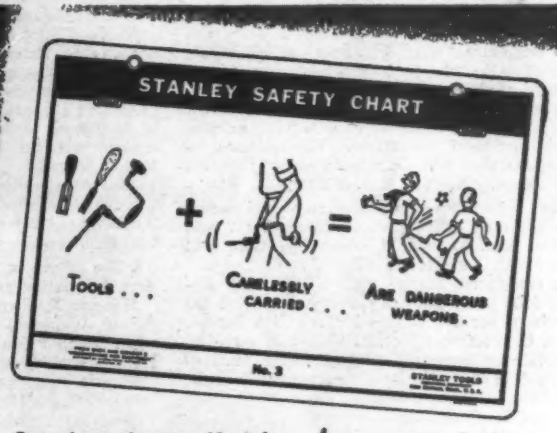

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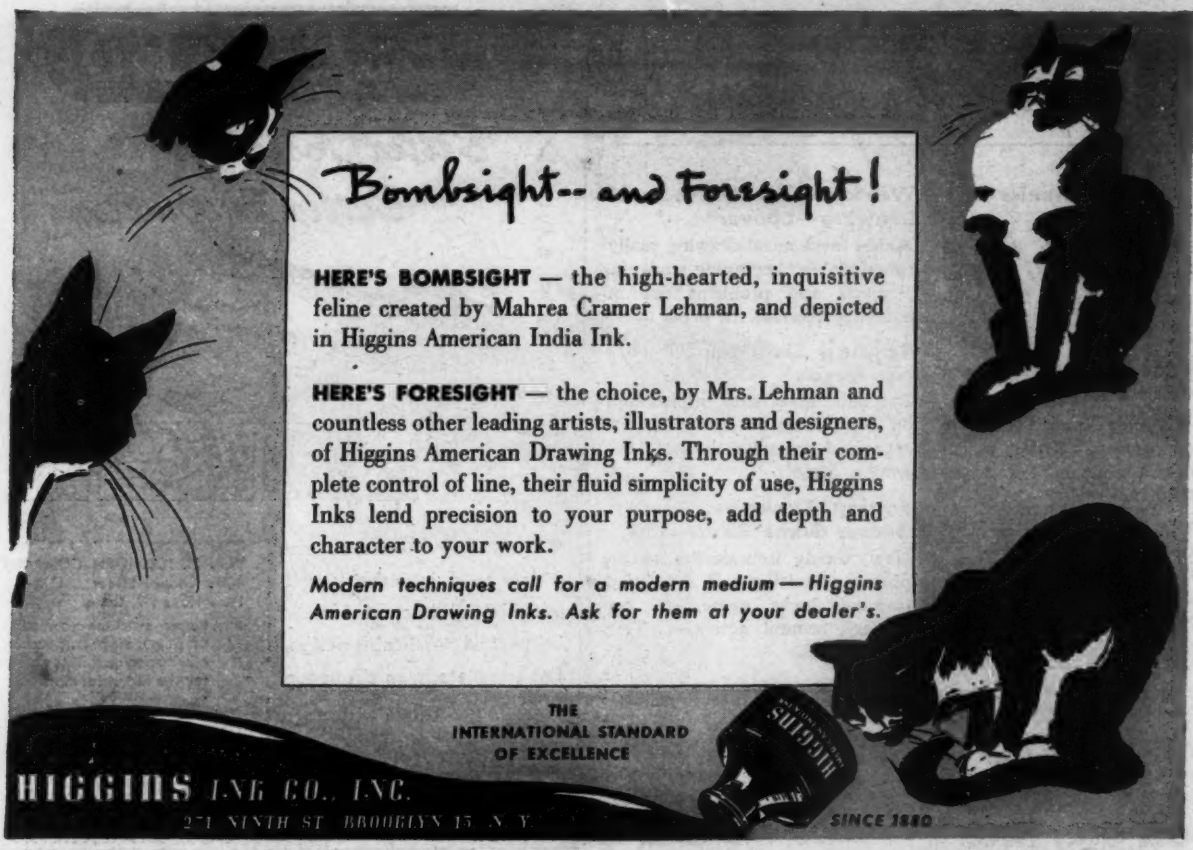
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(Continued from page 22A)

education; and Donald B. Greenwood, state supervisor of industrial arts for Utah.

The new officers were elected for the Industrial-Arts Section for the 1946–47 school year. Eldrid S. Larson of the Logan City Junior High School, and Fred A. Carlson of the South Cache High School at Hyrum, Utah, were elected as president and vice-president respectively. The secretary of the organization will be appointed by the two newly elected officers at a later date.

♦ The Iowa Industrial Education Association held its annual convention on November 7 and 8 at Des Moines, Iowa. The meetings were held at the North Des Moines High School.

The convention started with a fellowship dinner at 6:00 p.m., Thursday, November 7, at the cafeteria of the North Des Moines High School.

Ross Cramlet was chairman on this occasion. The following industrial-arts men were initiated into the *25–Year Club*: Paul Megchelsen, Keokuk; C. L. Page, Ottumwa; Eric C. R. Jordan, Springfield; and Hugh S. Logan, Waterloo.

The honor keys which were presented to these men were donated by the Heston and Anderson Company of Fairfield, Iowa.

The Ship's program, a courtesy of the convention exhibitors, followed the dinner, under the direction of Skipper Lew Webb, representative of the American Technical Society, Chicago, Ill.

At 10:00 a.m. Friday, the business meeting of the association was held. The new officers for the coming year are:

Lawrence J. Swartz, Marshalltown, president;
Albert J. Jensen, Council Bluffs, vice-president;
John Barrigar, Marshalltown, secretary-treasurer;
F. B. Hathaway, Mason City, director;
Charles McCoy, Davenport, director.

A luncheon was held at 12:00 noon and this was followed by a general meeting at which Professor Arthur G. Mays, University of Illinois, spoke on "Administration and Supervision of Industrial Education."

At the 2:30 p.m. meeting, Mr. V. S. Peterson, consultant, Extension Division, Du Pont de Nemours & Company, gave an address on "Research in Everyday Living."

At 3:15 a panel discussion was held on "Trends in Industrial Arts." Albert J. Jensen was the leader, and the panel members were George Mohr, Davenport, who represented the crafts; Milton Meuler, Burlington, mechanical drawing; Charles McCoy, Davenport, metals; Lawrence Simmering, Ames, woodworking; and I. G. Terry, Marshalltown, electricity.

♦ The officers of the Midwestern Ohio Industrial Arts Association are:

Harold F. Edgar, President — Wauseon High School, Wauseon, Ohio.
A. Dwight Spayth, Vice-President — Bluffton High School, Bluffton, Ohio.
Russel A. Swigart, Secretary-Treasurer — Bowling Green High School, Bowling Green, Ohio.
Darwin C. Eaton, Publicity — Swanton High School, Swanton, Ohio.

Program Committee:
E. C. Powell, Bowling Green State University, Bowling Green, Ohio.
C. J. Marshall, Mt. Cory High School, Mt. Cory, Ohio.
Robert Kruse, Lima South High School, Lima, Ohio.

Executive Committee:
A. W. Craft, Lima Central High School, Lima, Ohio.
Louis Miller, Napoleon High School, Napoleon, Ohio.

The following schools will be hosts: Fostoria, Ohio — November 20; Mt. Cory, Ohio — December 18; Lima South — January 15; Bluffton, Ohio — February 19; Wauseon, Ohio — March 19; Defiance, Ohio — April 16.

P. S. Waldeck, industrial-arts supervisor, was the speaker at the November 20 meeting. December 18 will be a round table discussion — *D. C. Eaton*, Publicity Manager.

♦ The Trade Industrial Education Association of Western Pennsylvania (T.I.E.) held its first meeting of 1946–47 in conjunction with the Western Pennsylvania Education Conference on October 25.

The speakers and their subjects at this meeting were:

Robert T. Stoner, chief, industrial education, department of public instruction, Harrisburg, Pa., on "Postwar Plans for Vocational Education"; and Stanley J. Pawelek, supervisor of industrial education, department of education, Baltimore, Md., on "Postwar Industrial Arts Education."

The officers for the coming year are: president, R. L. Hammerly; first vice-president, R. A. Ivy; second vice-president, Andrew Chuska; treasurer, John A. Wragg; recording secretary, J. E. Krotzer; directors, T. R. Allen, M. S. Du Barry, Wilbur K. Monks, Raymond Schmidt, E. S. Senkewitz, and W. C. Klinkensmith. Curtis R. Criss is chairman of the membership committee.

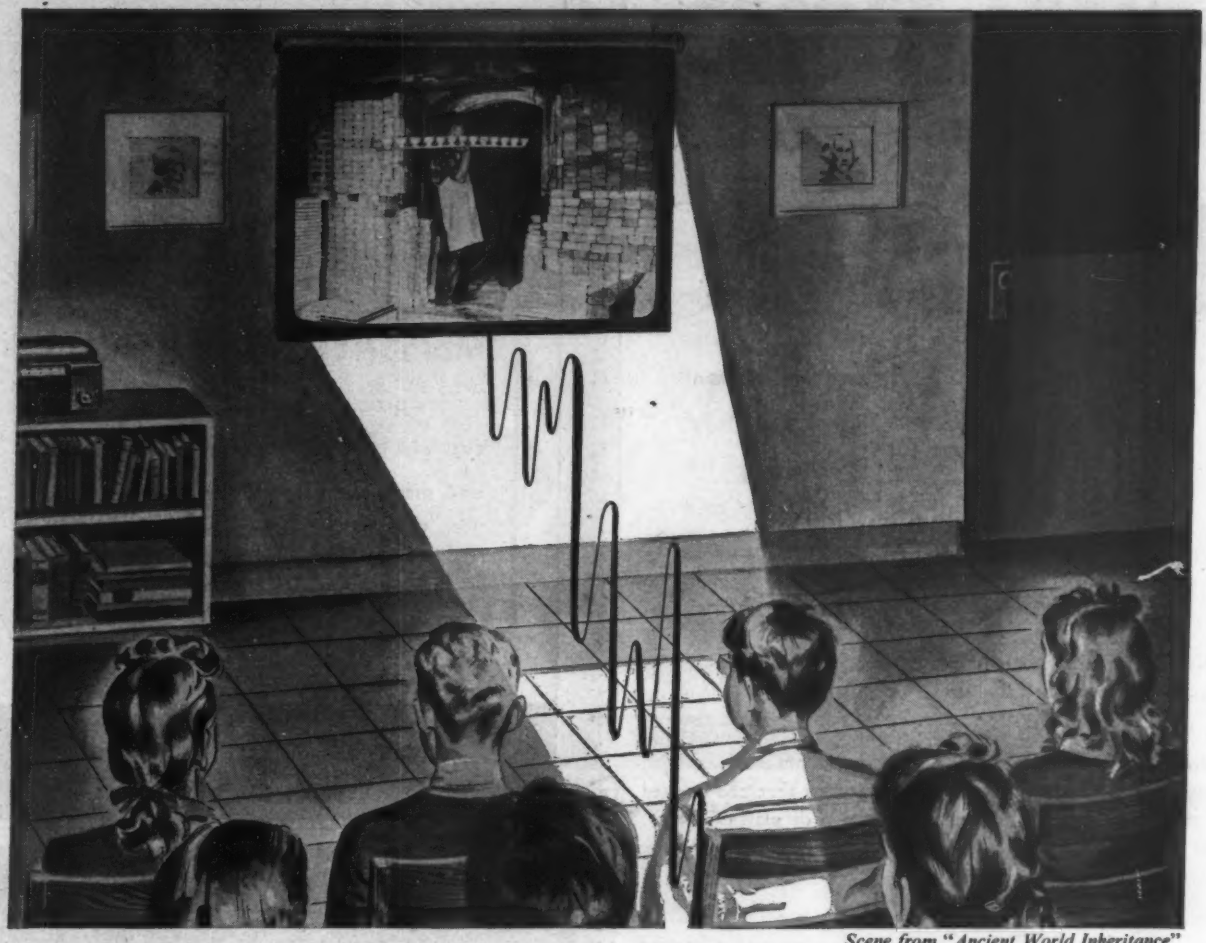
♦ The new officers of the Eastern District Vocational-Industrial Arts Association, Schenectady, N. Y., are: Ray C. Diver, president, Schenectady, N. Y.; Don Heath, vice-president, Troy, N. Y.; William Male, vice-president, Schenectady, N. Y.; James Budrakey, treasurer, Troy, N. Y.; James Steward, secretary, Schenectady, N. Y.

Tentative plans have been made to hold three meetings during the coming year. The first meeting to be held at Schenectady, on November 15; the second meeting at Albany on February 14, 1947; and the last one at Amsterdam, on May 2, 1947.

♦ The officers for the coming year of the Nebraska Vocational Association are:

Lewis Kein, Steward, Nebr., president;
Roy Equall, Superior, Nebr., vice-president;
Alvin Reimer, DeWitt, Nebr., secretary.

(Continued on page 27A)



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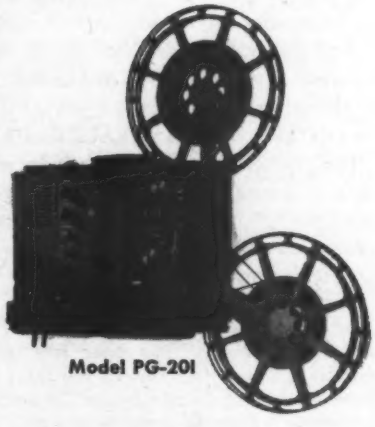

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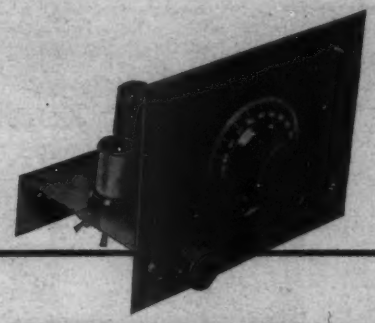

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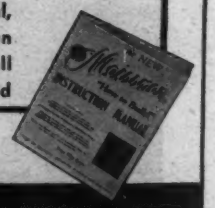

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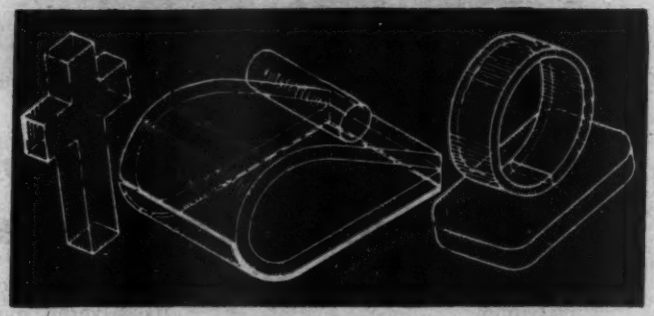

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(Continued from page 24A)

♦ The officers for 1946–47 of the California Agricultural Teachers, are:

ARTHUR J. GODFREY, San Luis Obispo, president;

J. EVERETT WALKER, Modesto, vice-president;

LIONEL CROSS, San Jose, secretary-treasurer.

♦ The twenty-first annual meeting of the Kansas Industrial Arts Association was held at Topeka, Kans., on November 1, 1946.

The morning meeting, held at 9:45 a.m., was under the chairmanship of P. W. Chamnes, director of vocational education, Topeka, Kans.

At this meeting Dr. R. A. Hinderman, assistant superintendent in charge of secondary schools and adult education, Denver public schools, spoke on the vital subject of "Human Relations in Business and Industry."

The same speaker gave an address on "Trends in Industrial Arts" at the afternoon session. The discussion leaders at this meeting were Dr. O. A. Hankammer, Pittsburg; J. C. Woodin, Wichita; and J. H. Douglass, Winfield.

At the business meeting the following officers were elected for the ensuing year: Ralph Schaude, Roosevelt Intermediate School, Wichita, Kans., president; Leigh De Lay, High School, Salina, Kans., vice-president; and R. L. Grandle, High School East, Wichita, Kans., secretary-treasurer.

♦ The 34th National Safety Congress and Exposition was held at Chicago, Ill., October 7 to 11.

At the group meeting on Safety in Industrial Education, which was held Wednesday morning, October 9, H. R. Graman, safety chairman of the Parker Vocational School, Dayton, Ohio, and editor of the School Shop News Letter, issued monthly by the National Safety Council, outlined a practical program of shop safety for industrial arts and vocational education classes.

Ray M. Stombaugh, director of the division of industrial arts and education of Illinois State Normal University, Normal Ill., addressed the group on "Teacher Preparation in School Shop Safety."

Presiding at the meeting was Frank C. Moore, directing supervisor of industrial arts, Cleveland Public Schools, Cleveland, Ohio.

Immediately following these two addresses a symposium, under the leadership of Roy Van Duzee, director of the West Allis School of Adult Education, West Allis, Wis., was held. The question discussed at the symposium was "What Can be Done to Assure a Real Program in Safety Instruction in the School Shops of the Nation?"

Speaking for industry was C. E. Wooliever, who is associated with the A. O. Smith Corporation, Milwaukee, Wis., and who is vice-president for industry of the National Safety Council.

Speaking for vocational education was Sylvan A. Yager, chairman of the department of industrial arts, trades, and industry of the Indiana State Teachers college, Terre Haute, Ind.

Speaking for industrial arts education was H. G. Palmer, acting head, department of arts, Iowa State Teachers College, Cedar Falls, Ia., and president of the American Industrial Arts Association.

Reporting experiences in army technical training was Keith W. Stewart, representing the Equitable Life Assurance Society of the U. S., Gary, Ind.

Speaking for the National Safety Council was Wayne P. Hughes, director of the school and college division.

A general discussion followed the symposium and speeches.

COMING CONVENTIONS

December 26–28. Illinois Education Association at Springfield, Ill. Headquarters, Elks Club. Irving F. Pearson, secretary, 100 E. Edwards St., Springfield, Ill.

December 26–28. Pennsylvania State Education Association at Harrisburg, Pa. Headquarters, Penn Harris Hotel. H. E. Gayman, secretary, 400 North Third St., Harrisburg, Pa.

News Notes

♦ The McGraw-Hill Book Co., Inc., New York City, is producing films to accompany its college and high school texts on mechanical drawing. There will be both motion pictures and film strips.

♦ Air-Age Education Research, 100 East 42nd St., New York 17, N. Y., have published six interesting classroom wall charts, 35 by 47 in., in colors. These charts will be of especial interest to those who teach aeronautics in junior and senior high schools.

The subjects covered by the charts are: aerodynamics, meteorology, aircraft, navigation, the air ocean, and radio navigation.

♦ N. M. PITTMAN, who for the past eight years has been instructor of industrial arts in the Leverett's Chapel High School, Overton, Texas, announces that his school has recently secured through donation the following machines from the surplus property division of the army engineers:

De Walt radial saw, 5 h.p.; Wysong and Miles hollow chisel mortiser No. 284; 8 No. 3 h.p. belt sander No. 171; Skilsaw portable electric saw No. 77; Delta drill press, 14 in.; Cincinnati grinding and milling machine, 5 h.p.; and a Gossiger drilling and tapping machine. This additional equipment makes this industrial-arts department one of the best equipped in the East Texas oil field district.

♦ The Virginia Vocational Education Fund has allocated $75,000 to be used for the construction of a shop building for the Manassas Industrial School. This school is Virginia's only regional school. It is operated by the following counties:

(Continued on next page)

no substitute can take the place of a good book. But a fine motion picture can make the book much easier to understand and remember.

Take Johanna Spyri's *Heidi*, for example. For generations children have loved this book—but they often have difficulty in understanding certain words and expressions. Now they are able to see the book come to life on the screen. In the motion picture *Heidi* they can see all those details which would take many hours to explain.

The motion picture *Heidi* is distributed by Films Incorporated in 16 mm. for showing on school projectors. It is one of several hundred full-length features and dozens of short subjects and cartoons especially selected for school showing. To get the full story of the services which Films Incorporated offers to schools, ▶ just send a postcard request for the current School List catalog.

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(Continued from previous page)

Prince William, Fairfax, Fauquier, Warren, Rappahannock, and Shenandoah. These counties will further finance the erection of a girls' dormitory, and the renovation or erection of a gymnasium and auditorium.

♦ The New England Textile Foundation, 68 South Main St., Providence 3, R. I., announces that it will award up to forty $500 freshman scholarships in 1947 in Bradford-Durfee Technical Institute, Fall River, Mass.; Lowel Textile Institute, Lowell, Mass.; New Bedford Textile Institute, New Bedford, Mass.; or Textile School of Rhode Island School of Design, Providence, R. I. These scholarships will be available to graduates of accredited senior high schools or preparatory schools who will not be over 21 years of age on July 1, 1947, and to seniors of said schools in good standing. Only students interested in a textile career should enter this scholarship contest. "Textile" in this case includes all types of fibers and the manufacture of yarn and fabrics, coloring and finishing of raw stock, yarns, and fabrics, and design of printed, woven, or knitted fabrics, but *not* of wearing apparel.

For further information write to the Foundation at once as the final applications must be postmarked not later than January 15, 1947.

♦ A four-year apprentice training program for youths 16 to 22 years of age was authorized recently by Bausch & Lomb Optical Company and the New York State Apprenticeship Council.

Under the agreement, the first signed by a large Rochester company, high school graduates will be trained as future machinists, toolmakers, draftsmen, or instrument makers. Eligibility exceptions will be allowed servicemen and present employees of the company over the 22-year age limit.

The 8000-hour training program has been approved and registered with the State Apprenticeship Council at Albany, and conforms with standards drawn up by the council and the company.

♦ Westinghouse School Service of the Westinghouse Electric Corp., 306 Fourth Ave., Box 1017, Pittsburgh, Pa., announces a new 14-page booklet describing free and inexpensive teaching aids for high school teachers.

This material includes booklets, charts, motion pictures, and slide films for a variety of classes. Some of the booklets may be obtained in quantities for distribution to students. Teachers will be interested in others as desk copies.

♦ Bill HR 6932, passed by the last Congress, authorizes the expenditure of $61,000,000 for agricultural research in the next five years. This money may be used for research on improved methods of production; new and extended uses and markets; new crops, plants, and animals; more profitable uses of agricultural resources; development and conservation of our lands, waters, and forests; and improvement of farm homes, buildings, and machinery.

♦ The reports from state boards of vocational education disclose the fact that our states and territories have, during the past year, enrolled a total of 2,002,895 students in vocational education, and that the expenditures for this work amounted to $65,641,640.50, covered by funds collected from federal, state, and local sources.

♦ A 25-minute sound motion picture dramatizing the story of the world's hardest metal—Carboloy cemented carbide—has recently been released by Carboloy Company, Inc., Detroit, Mich. The picture is entitled "Everyday Miracles" and was shot on location at Carboloy's main plant in Detroit.

In the picture a metallurgist tells an involved technical story in a simple manner acceptable to technical and nontechnical people about carbide, "the hardest metal known to science."

For the present, distribution of "Everyday Miracles" is confined to engineering classes in technical schools and to machineshop classes in vocational schools. Distribution of 16mm. prints will be handled by Modern Talking Picture Service, 9 Rockefeller Plaza, New York City 20, N. Y.

♦ A new educational sound film, "Clear Track Ahead!", telling the story of railroad transportation from the days of the picturesque "John Bull" locomotive of a century ago to the gigantic streamlined steam, electric, and Diesel engines of today, is now available without charge for showing to school assemblies, social studies classes, Parent-Teacher meetings, and other gatherings.

The film runs approximately 25 minutes in its 16 millimeter form, and may be booked for showings anywhere in the United States through G. E. Payne, System Publicity Representative, Pennsylvania Railroad, Room 1587, Broad Street Station Building, Philadelphia 4, Pa.

♦ The number of apprentices in the construction industry is continuing to increase, with 83,519 listed in all of the building trades at the end of October, setting a new all-time high.

This number is 3410 more than were recorded at the end of September when the previous record was established, and represents a gain of 4 per cent over the cumulative total.

All of the basic building trades showed increases last month and there continued to be more applications for employment and training in apprenticeship than could be accommodated.

♦ A new evening trade class, patterned on federal apprenticeship requirements, was started for plumbers at Hannibal, Mo.

The plumbers will meet two evenings each week. Samuel Lotta, a journeyman plumber, was appointed as instructor.

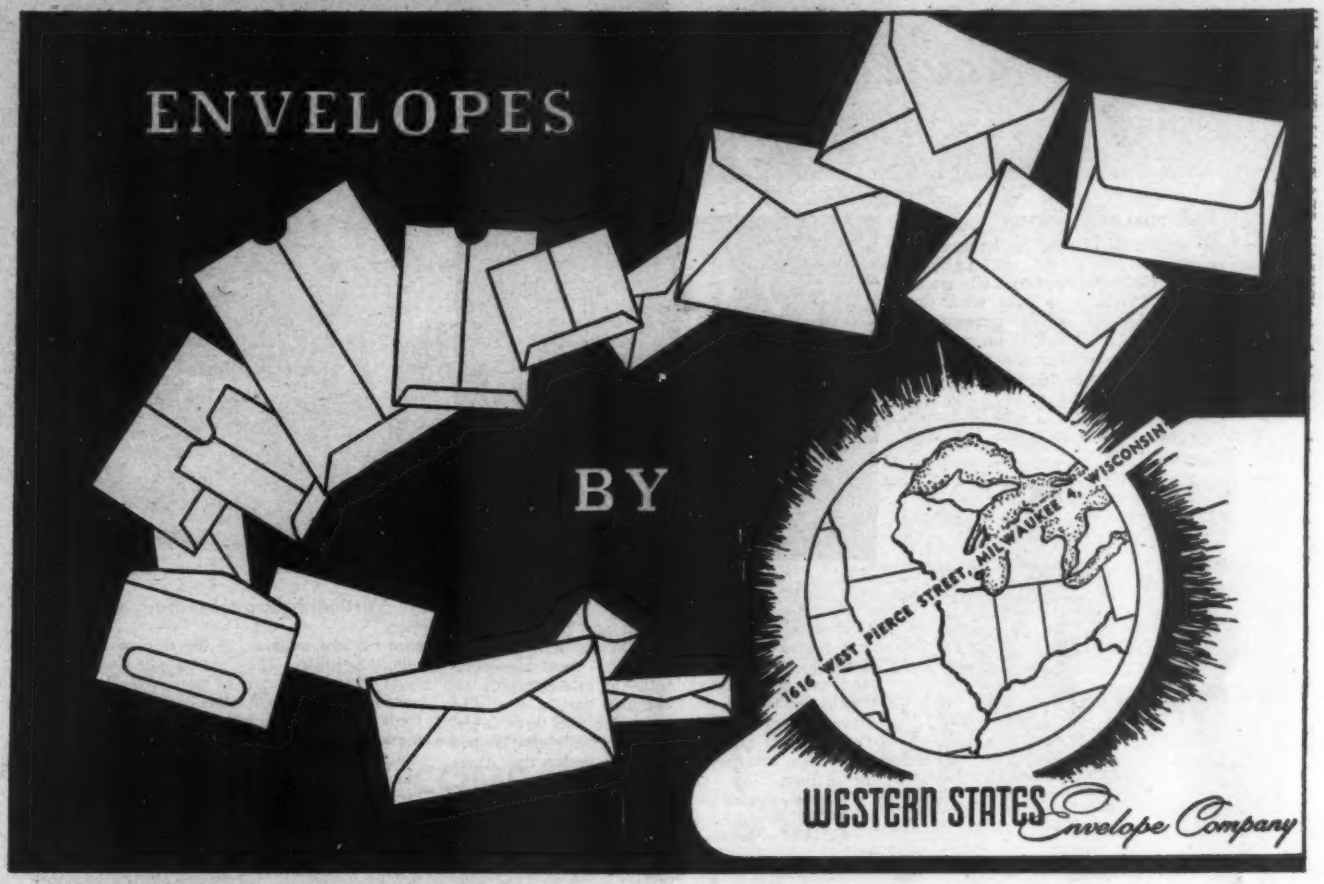
♦ The Madison Vocational and Adult Education School, Madison, Wis., is offering a special evening course for parents who are interested in how public schools are serving their children. Four courses are given in co-operation with the Madison Parent-Teacher Association.

The first, "Know Your Schools," interprets school policies and procedures.

The second, "Radio Listening," is designed for parents and laymen who are interested in radio programs for their children and themselves.

The third, "Selection for Children," is intended to help parents in the proper selection of books for their children.

The fourth, "Visual Education," helps the parent to become better acquainted with the use of visual instruction in the schools and the place of the public movie in child development.



New Publications

Coyne Radioman's Handbook

Prepared and published by Coyne Electrical School, 500–526 South Paulina St., Chicago 12, Ill. Flexible leatherette binding, 321 pages, 4½ by 7⅛ in., illus., $3.25.

This is a reference and data book for those who are studying this subject, working in this field, or are interested in this phase of electricity.

Its 17 sections cover the subjects of electrical symbols, mathematics, resistance and insulation, electrical circuits, power, capacitors and capacitance, receiving tubes, coils and coil winding, reactances and energy losses, resonance and coupling, transformers, power supply with batteries and a.c.–d.c. lines, amplifiers, receivers, oscillators and antennas, sound systems and devices, and meters and measurements.

Educating for Industry

By William F. Patterson and M. H. Hedges. Cloth, 229 pp., 5⅝ by 8¼ in., $2.50. Prentice-Hall, Inc., 70 Fifth Ave., New York City.

A thorough explanation of what apprenticeship means to the apprentice, to management, and to labor.

The book shows the reader how important apprenticeship is in our machine age, how the standards for a trade are set up, what the national apprenticeship program aims to do, shows what the role of the states is in this program, how the program is taken care of in the individual plant, how the apprentice receives his related instruction, and what occupations are suited to apprenticeship.

Young America's Aviation Annual

By David C. Cooke. Cloth, 224 pp., 6 3/4 by 9 5/9 in., illus., $3. Robert M. McBride & Co., New York City.

An interesting history of what our air power contributed to the winning of the war. The book also portrays how the war stimulated design improvements so that America can truthfully boast of having produced the best airplanes that fought in the war and also made it possible for our allies to do their part with our equipment in beating the enemy.

The book is written in easily understood nontechnical language.

Welding Aluminum

Paper, spiral binding, 90 pp., 5½ by 8¾ in., illus. $1. Published by Reynolds Metals Co. Inc., Louisville 1, Ky.

A manual which gives concise, well-illustrated directions on how to weld aluminum and aluminum alloys by gas, arc, and resistance welding, and also shows how this metal may be brazed and soldered.

Heat Treating Aluminum Alloys

By O. L. Mitchell and G. W. Birdsall. Paper, wire-bound, 144 pp., 6 by 9 in., illus., $1. Reynolds Metals Co., Dept. 47, 2500 So. Third St., Louisville 1, Ky.

The purpose of this book is to provide information in a form readily usable by both the nontechnical man and the highly trained technician.

To attain this end, the first section of the book breaks down the subject into easily understandable concepts which the nontechnical reader can follow and so obtain a basic understanding of the metallurgy and heat treatment of the aluminum alloys. This is a simplified explanation of the *what, why* and *how* of heat-treating aluminum.

Section Two presents in brief tabular form the recommended thermal treatments for the various aluminum alloys.

Section Three is for the metallurgist and operating personnel. There will be found a more technical discussion of the various thermal treatments as well as detailed information on possible difficulties and suggestions for their cure.

English-French and French-English Technical Dictionary

By Francis Cusset. Cloth, 581 pp., 5¼ by 6⅝ in., $5. Chemical Publishing Co., Inc., Brooklyn, N. Y.

A real help to those who have to read or translate French technical terms into the English language. It is a necessity in technical libraries and to students who have to refer to scientific books written in the French language.

Shop Terms

Prepared by The Department of Education, International Business Machines Corporation, and the Syracuse University Press, Syracuse, N. Y. Paper, 106 pp., 5¼ by 7½ in., illus.

A manual containing definitions describing the materials, tools, machines, and processes met with in industry.

The appendix contains a pronunciation guide, formulas for solving the right triangle, tables of trigonometric functions, rules for determining milling speeds and feeds, machining speeds, and other tables of useful information.

Wood Patternmaking

By Herbert J. McCaslin. Cloth, 365 pp., 5 by 7½ in., illus. $2.60. McGraw-Hill Book Co., Inc., New York and London.

This is the fourth and enlarged edition of this very thorough text. The book presents explicit directions for making 61 different kinds of patterns, explains how the hand and power tools are used in making them, and then gives directions on how patterns are checked and inspected.

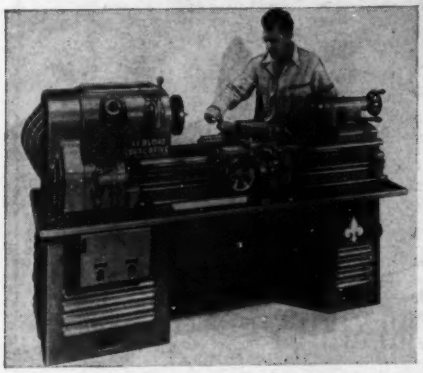
Shop Equipment News

NEW PRODUCTS — PUBLICATIONS

NEW DUAL-DRIVE LATHE

A new lathe with dual driving mechanism has just been announced by the R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio. Known as the LeBlond Dual Drive, it is built with two separate driving arrangements, a gear drive, and a direct belt drive. It swings 15 in. over the bedways, can be built with center distances starting at 30 in., and is powered by a 3 h.p. main drive motor.

The Dual Drive lathe offers 12 spindle speeds, four of which are high speeds for use with carbide tools.



The new LeBlond dual drive

The low speed, or gear drive, runs from the main v-belt motor drive, through a gear train, to the spindle. The 8 speeds in this range are 28, 41, 60, 95, 134, 193, 282, and 445 r.p.m.

The high speed, or direct belt drive, runs through four gear speed changes to a high speed shaft, then direct to the spindle through a second double v-belt drive. Thus, the gear drive is cut out completely, and the high speed drive for all practical purposes is direct to the spindle. The four speeds in this range are 540, 782, 1140, and 1800 r.p.m.

The 12 spindle speeds are controlled by a single lever, which can be set to the desired speed very quickly.

The spindle and drive shafts run on antifriction bearings. This, together with the fact that alloy steel gears and shafts run in oil provided by an automatic forced feed lubricating system, provides a very quiet and smooth drive.

The quick change feedbox is totally enclosed, and the gears are lubricated by oil pumped automatically from the main reservoir.

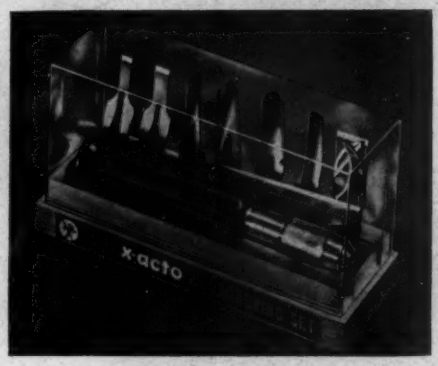
The electrical control panel on the head end leg contains main drive motor, start-stop push buttons, and drum switch for presetting direction. The Dual Drive lathe is equipped with one-piece apron with positive jaw feed clutch; one shot lubrication to all apron bearings, cross slide, and carriage ways; rapid speed selector for selecting correct cutting speeds for all commonly machined materials.

For detailed information about the new Dual Drive lathe, address The R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio.

For brief reference use IAVE—0101.

NEW GOUGE AND CHISEL SET

Wood carvers, whittlers, linoleum and woodblock artists, model builders, and other hobbyists will be pleased with the new No. 77 X-acto Wood Carving Set containing six gouge and chisel blades,



Gouge and chisel set

four standard X-acto straight and curved blades, and two 3-inch blades together with a specially designed handle in which all of these blades fit and can be easily and quickly interchanged. All of the blades are made of high carbon steel and have been ground to a fine surgical keen edge.

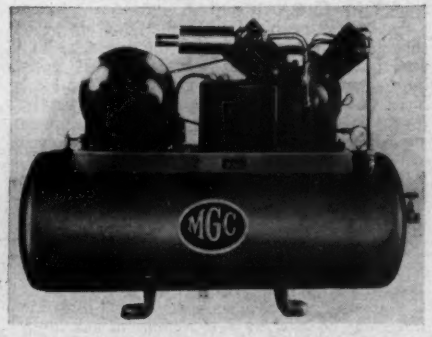
The chisel and gouge blades have ribs shaped into them to prevent bending under the strain of cutting.

The set comes packaged with a special woodblock mount and a clear plastic cover.

For brief reference use IAVE—0102.

TWO-STAGE AIR COMPRESSORS

Five new models of Super-Duty Two-Stage Air Compressors are being announced by Motor Generator Corporation, a division of The Hobart Brothers Company, Troy, Ohio.



Two-stage air compressors

These compressors will be available in 7, 9, 13, and 21 cubic foot capacities and all are furnished with 80 gallon storage tanks, or a 60 gallon tank is optional with the 7 cubic foot unit.

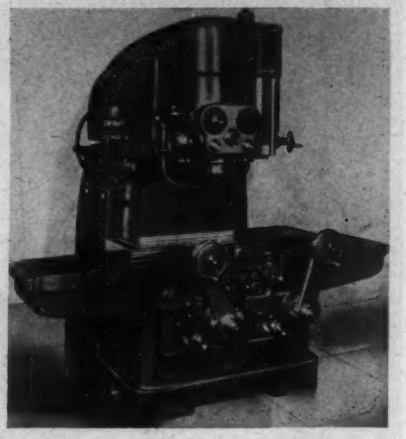
The compressors are of the self-contained type with motor and compressor mounted on a one piece steel subbase which in turn is electrically welded to an 80-gallon horizontal air receiver. They are fully automatic and controlled by centrifugal type unloading valves which guarantee against motor burnout.

Power transmission is direct from the heavy-duty motor by multiple "V" belts with slack take-up provided. The air pressure is automatically controlled, the pressure switch contacts closing at minimum air requirement and opening at maximum air requirement.

For brief reference use IAVE—0103.

NEW VERTICAL HYDRO-TEL MILLING MACHINE

The Cincinnati Milling and Grinding Machines, Inc., Cincinnati, Ohio, have announced a Hydro-Tel line of vertical milling machines suitable for milling and die sinking operations. The machines are available in several styles: (1) general pur-



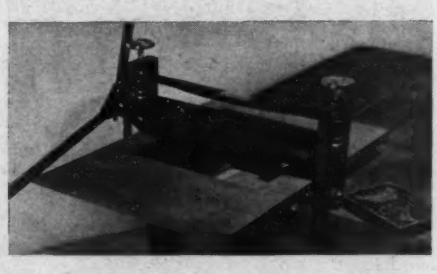
Vertical hydro-tel milling machine

pose vertical miller; (2) die sinker; and (3) automatic profiler. They are supplied with a table, cross slide, and vertical power feed rates independently controlled, fixed bed construction, hand feeds for any slide, automatic lubrication of bearings, air-insulated hydraulic oil tank, built-in quick-change spindle nose, power feed, and guards to keep out chips and dirt. A booklet containing information will be sent upon request.

For brief reference use IAVE—0104.

PHOTOGRAPHY AND THE GRAPHIC ARTS

The possession of a camera and a Laszlo Universal Hand Press opens up many possibilities to the learner or hobbyist interested in the graphic arts.



Laszlo universal hand press

How easily this combination can be used for producing various graphic-arts products is tersely told in the following:

1. *Etching Portrait.* Place transparent plastic (acetate) plate on top of photo portrait enlargement and scratch line drawing in plastic following photo. Daub oil printing ink in scratched lines, wipe off superfluous ink, place plate on flatbed of press, place damp paper on top, roll over under heavy pressure, and find sharp perfect etching portrait on paper.

2. *Lithograph Portrait.* Draw portrait on photo enlargement with grease (litho) crayon, dampen photo, transfer image under pressure to zinc litho plate, gum up, etch and print hundreds of perfect proofs.

3. *Color Lithograph.* Same as No. 2 but one additional plate for each color is necessary.

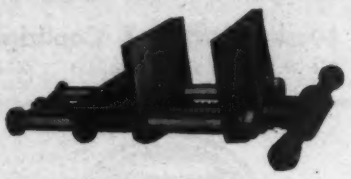
4. *Bromoil Prints.* Bleach photo (use no hardener in hypo), soak in glycerin-water solution, blot, ink up with litho inks, place damp paper on top, roll over under heavy pressure.

(Continued on page 33A)

MORGAN

SOLID NUT CONTINUOUS SCREW VISE

Hardwood Handle — Stop in Front Jaw



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EACH GUIDE PROVIDES

(a) Assignments in the technology of the trade and on related subjects, based on standard texts.

(b) Study questions, student check-questions, and periodic examinations on both the technology and the related information.

(c) Assignment charts that indicate the place in the course at which related instruction should be given.

Produced by the Wisconsin Schools for Vocational and Adult Education, and with the cooperation of the State Board of Vocational and Adult Education.

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7. Machine Shop
8. Sheet Metal
9. Arc and Gas Welding
10. Tool and Die Work
11. Retail Salesmanship
12. Store Management

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This new book is a splendid example of the workmanship of two well-known and respected teachers and will claim a high place in the growing handcraft field as a work of unusual value and interest. A veritable "treasure" of craft projects, *YOUR CRAFT BOOK* has been developed for the intermediate classes. There are *108 well designed projects*, covering a wide range of activities and materials in *needlework, plastics, wood, paint, clay and paper*, but involving *handwork only* and calling for simple, inexpensive materials and tools. Enhanced by *20 varicolored plates* and *88 black and white plates*, this book offers full sized patterns augmented by concise directions in the text material. *YOUR CRAFT BOOK* is an ideal *craft workbook for schools*, offering countless opportunities to use originality and providing many fine examples of art principles as applied to construction work. This new book is bound in cloth and jacketed, contains 224 pages on an 8½x10⅞ format. *We suggest you order your inspection copy at once!*

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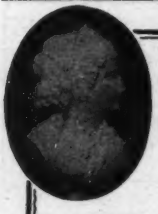

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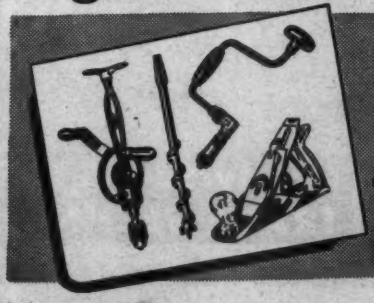

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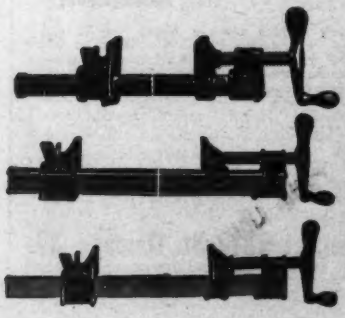

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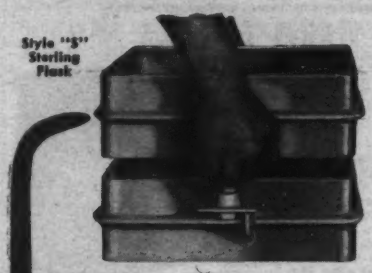

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(Continued from page 30A)

5. *Collotype.* Similar as No. 4 except use thick photo film positive enlargement instead of paper photo. Three color separation positives produce perfect color prints as large as 16 by 24 in. The flatbed of the Laszlo Press has registering pins to fit holes punched in film plates.

6. *Wood or Linoleum Cut.* Draw lines on surface of photo, dampen, place face down on wood or linoleum block, transfer design under heavy pressure, carve out, ink up with water or oil inks, print on any paper.

For further information address Rembrandt Graphic Arts Co. Inc., 165 East 60th Street, New York 22, N. Y.

For brief reference use IAVE—0105.

NEW METAL MELTING FURNACE

A new metal melting furnace offering unusual efficiency and economy is announced by the Johnson Gas Appliance Company, 585 E. Avenue N.W., Cedar Rapids, Iowa. This new furnace, designated the Johnson 616, will melt 600 pounds

New Johnson melting furnace

of lead in 29 minutes. It is equipped with 6 atmospheric fired Johnson Direct Jet bunsen burners each having independent shutoff valve and pilot light. Heavy insulating refractory around removable pot retains heat and minimizes operator fatigue. Pot temperatures up to 1500 deg. F. are quickly reached with 6 burners, and held at working level with 3 burners. This operating feature permits substantial savings in both time and fuel in melting such metals as lead, babbitt, tin, zinc, aluminum, and type metal.

For brief reference use IAVE—0106.

THE OCTOBER STANLEY NEWS

This issue of the "Stanley News" published by the educational department of Stanley Tools, New Britain, Conn., describes their new safety charts; the booklets: *Yankee Tool Book, Russell Jennings Auger Bits — How to Sharpen and Care for Them, Expert Soldering, 16 Plan Book, How to Work With Tools and Wood, The Stanley Tool Guide, 95 Plans in Loose-Leaf Binder,* and the new edition of their *Tool Catalog.*

It also contains illustration of all of the projects contained in their 19 sets of project plans.

For brief reference use IAVE—0107.

NEW JAM HANDY SALES SUPERVISORS

Five regional sales supervisors for the School Films Division of The Jam Handy Organization are now in the field facilitating the sale of school films produced by the organization to meet the needs of the general school films market and the distributors of Jam Handy products.

In addition to the sales responsibilities carried by this national service implementation, these supervisors will co-operate with schools and distributors for The Jam Handy Organization in selecting, developing, and promoting visual aids in education.

To insure adequate coverage of the visual training needs of teachers, the following supervisors are contacting instructors and distributors

(Continued on next page)

Smooth, steady power at your fingertips! Ideal tool for hobbyist, repairman, mechanic, novice or craftsman. Works on wood, plastic, metal, alloy, glass, leather, horn, stone, etc. 25,000 r.p.m. AC or DC. Wt. 12 oz.

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(Continued from previous page)

in these areas: Clay Walker, Atlantic Coast; Keith Ledyard, Southeastern states and Michigan; Burt Hayer, Central States; Arnold Schultz, Midwestern section; and L. G. Stewart, Pacific Coast.

DOALL ANNOUNCES NEW INSTRUCTION PROGRAM

Volume I of Instruction Programs, DoALL Machine Tools and Gauges, covering the technique of contour sawing, has just been announced by the DoALL Company, Minneapolis, Minn. Primarily intended for use in educational and vocational institutions, this book will also be useful to firms in the instructing of trainees.

The instructional material covers contour sawing and filing in all its aspects, applications, and operational techniques, and all phases of sawing and shaping in all types of materials. The book is divided into two sections, one covering conventional, the other high speed sawing procedures, including work projects and tests to be given trainees as well as grading data.

Four years in preparation, this material is substantially the same as used with such success by the army and the air corps in its training of DoALL operators.

Full particulars can be obtained from The DoALL Company, 1301 Washington Avenue, South, Minneapolis 4, Minn.

For brief reference use IAVE—0108.

A HELPFUL ELECTRICAL CATALOG

The Reading Electric Co. Inc., 200 William St., New York 8, N. Y., has just published a very helpful catalog on General Electric Renewal Parts and Supplies.

It contains a pictorial table of contents which refers the reader to the pages which cover the type of apparatus for which renewal parts may be required.

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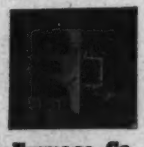

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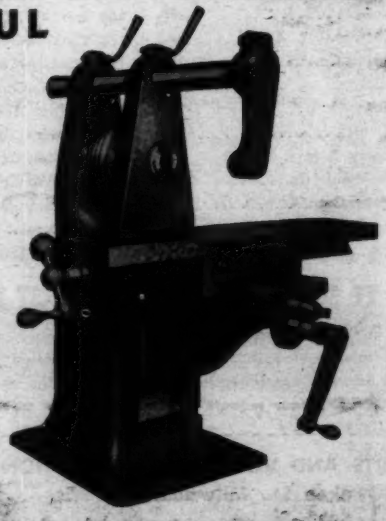

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